Certificates

Prof. Anjali M. Dalvi

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune – 44

Department of Computer Engineering

One Week

FACULTY DEVELOPMENT PROGRAM

ON

"Advanced Software Engineering & Project Management"

Certificate of Participation

This is to certify that **Prof. Anjali Sanjivanrao More** participated in Faculty Development Program on **"Advanced Software Engineering & Project Management"** from 03/01/2022 to 07/01/2022. The program was organized by Dr. D. Y. Patil Institute of Engineering, Management and Research Akurdi Pune, in association with Indian Society for Technical Education (ISTE).

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Co-ordinator

Mr. Prateek Meshram
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Anjali S. More

Performance enrichment through parameter tuning of random forest classification for imbalanced data applications

Authors	Anjali S More, Dipti P Rana
Publication date	2021/12/29
Journal	Materials Today: Proceedings
Publisher	Elsevier
Description	One of the foremost application domains in today's real-life scenario is unequal data distribution within datasets, related classifiers, and its Performance Enrichment Techniques (PET). Random Forest Classification (RFC) is one of the most efficient techniques that can function speedily over binary or multiclass imbalanced characteristics datasets. With its built-in ensemble capacity, building a generalized model on any Binary Imbalanced Datasets (BID) and Multiclass Imbalanced Datasets (MID) gets much easier. Related work carried out here implies that the attention of researchers is inclined towards ID applications and related machine learning techniques. RFC gives improvised performance due to Ensemble Approach (EA). EA generates several classifiers and segregates the results as PET. The performance of the single classifier is lower than the performance of the set of multiple classifiers. The associated ...
Scholar articles	Performance enrichment through parameter tuning of random forest classification for imbalanced data applications AS More, DP Rana - Materials Today: Proceedings, 2021

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INTERNATIONAL STANDARD SERIAL NUMBER
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Prof.(Mrs.) Jyotsna V. Barpute

Assistant Professor, Department. of Computer Engineering, SRTTC FOE, MH, India

Published a Research Paper Entitled

PRODUCT RECOMMENDATION SYSTEM USING ONLINE REVIEWS

in OAIJSE, Volume 6, Issue 12, December 2021

Certificate No : OAIJSE70972

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Editor-in-Chief
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UGC JOURNAL No 64067(2017)

Date : 04/1/2022

DOI 10.51397/OAIJSE.12.2021.0002

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Dr. Pramod Patil, Member, BoS Computer Engg. (SPPU)
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Dr. V.R.Sonawane	Dr. Aditya Abhyankar	Prof. N.B.Desale	Dr. S. R. Devane
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as a participant in One Day Faculty Development Program on TE-COMP Revised syllabus (2019 course) SEM -II for the subject "Cloud Computing" held on 11th FEB 2022.

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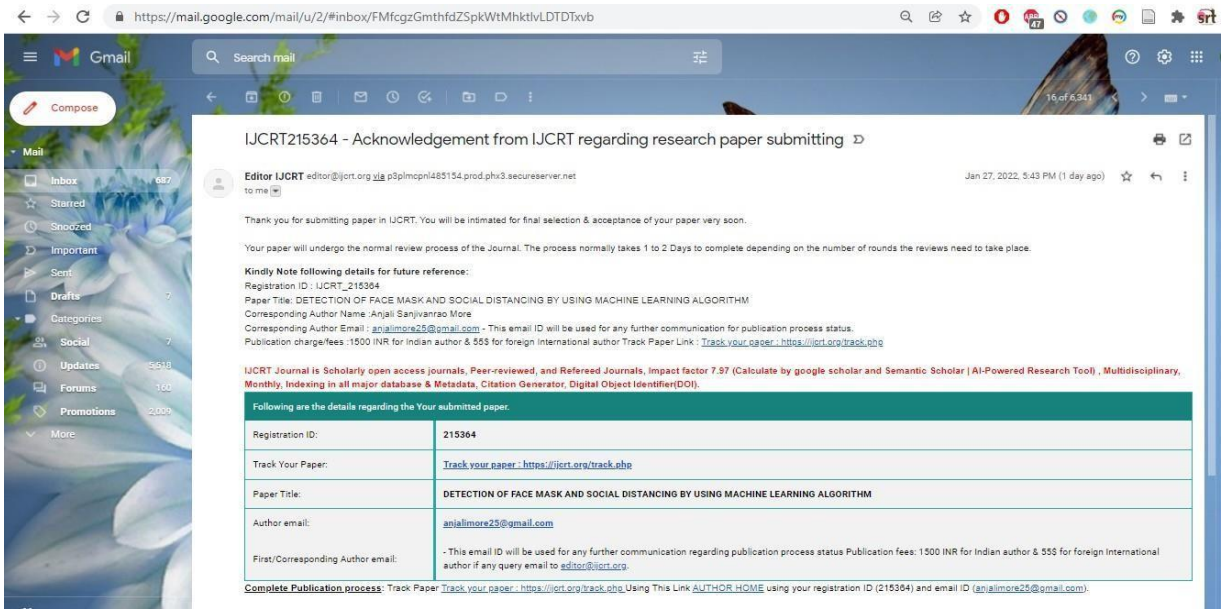

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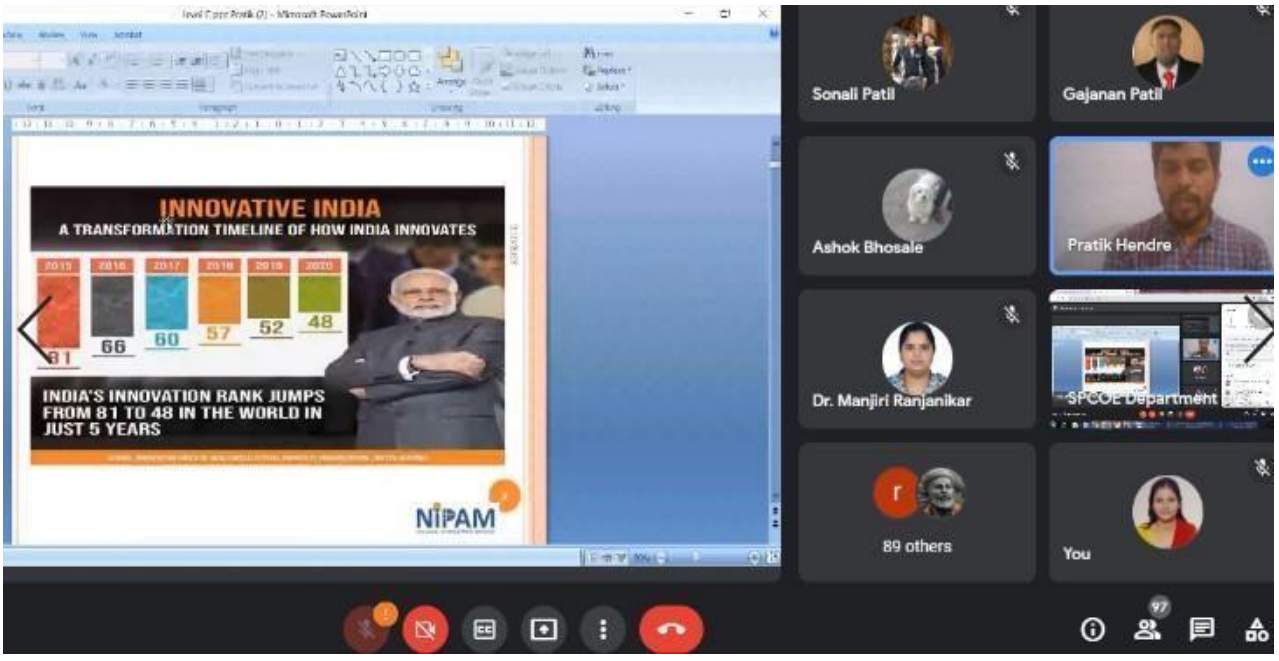

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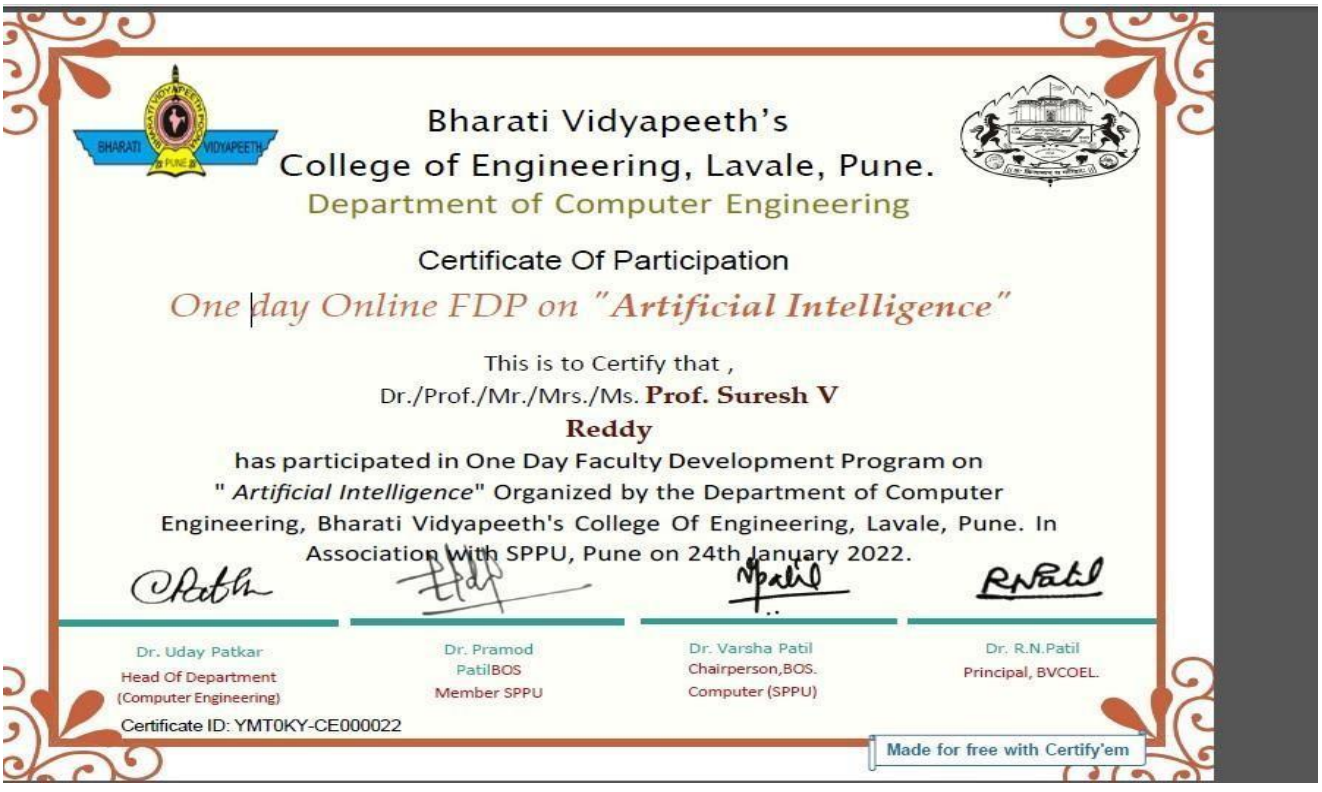

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Matoshri College of Engineering & Research Centre, Eklahare, Nashik

Department of Artificial Intelligence and Data Science

FACULTY ORIENTATION PROGRAM

"MANAGEMENT INFORMATION SYSTEM"

(SE Artificial Intelligence and Data Science 2019 Pattern)

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Date: **09/03/22**

Dr. Dhananjay Deshpande
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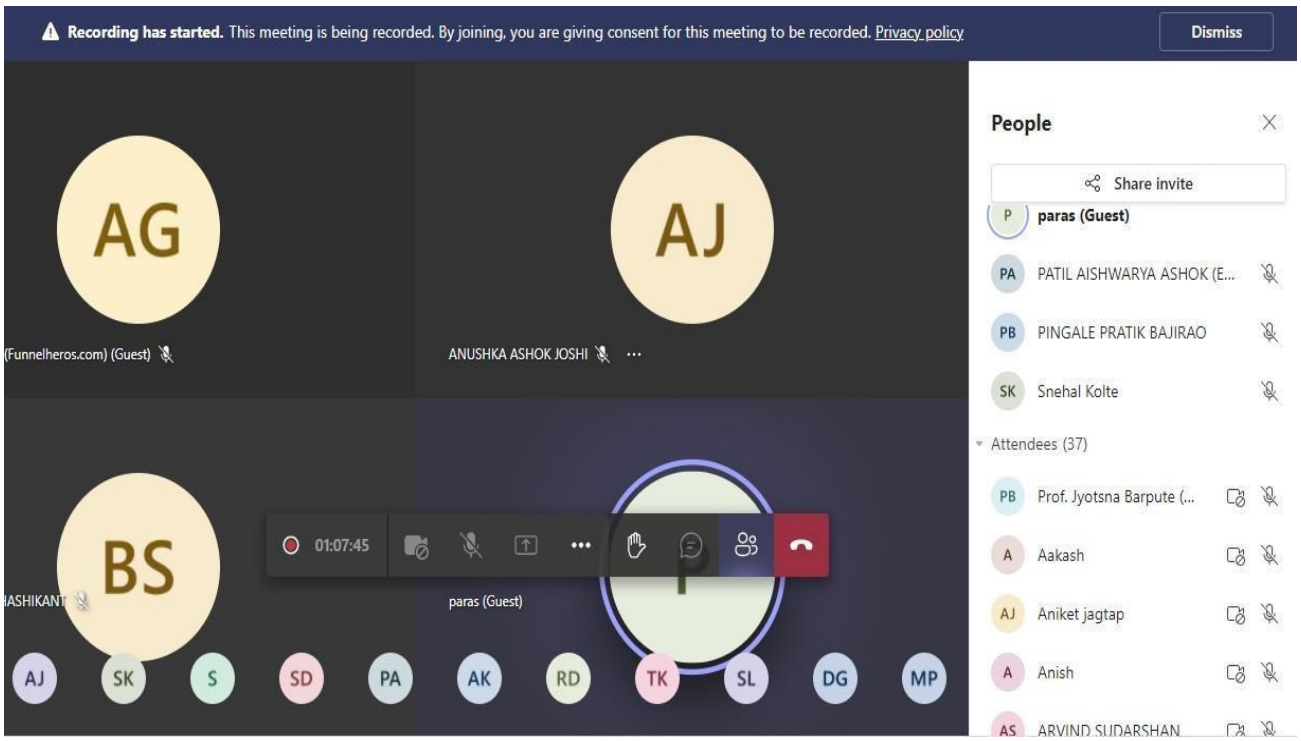

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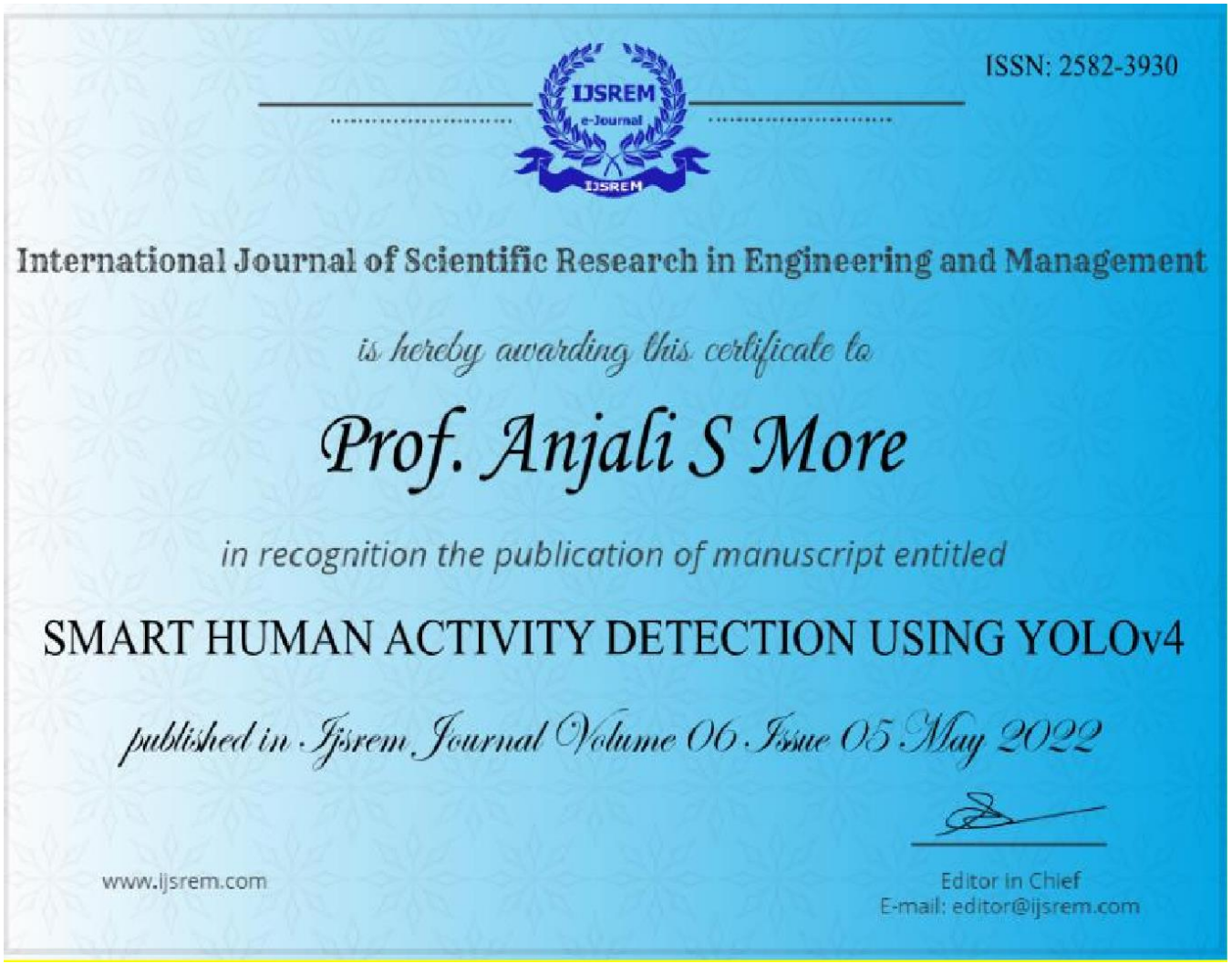

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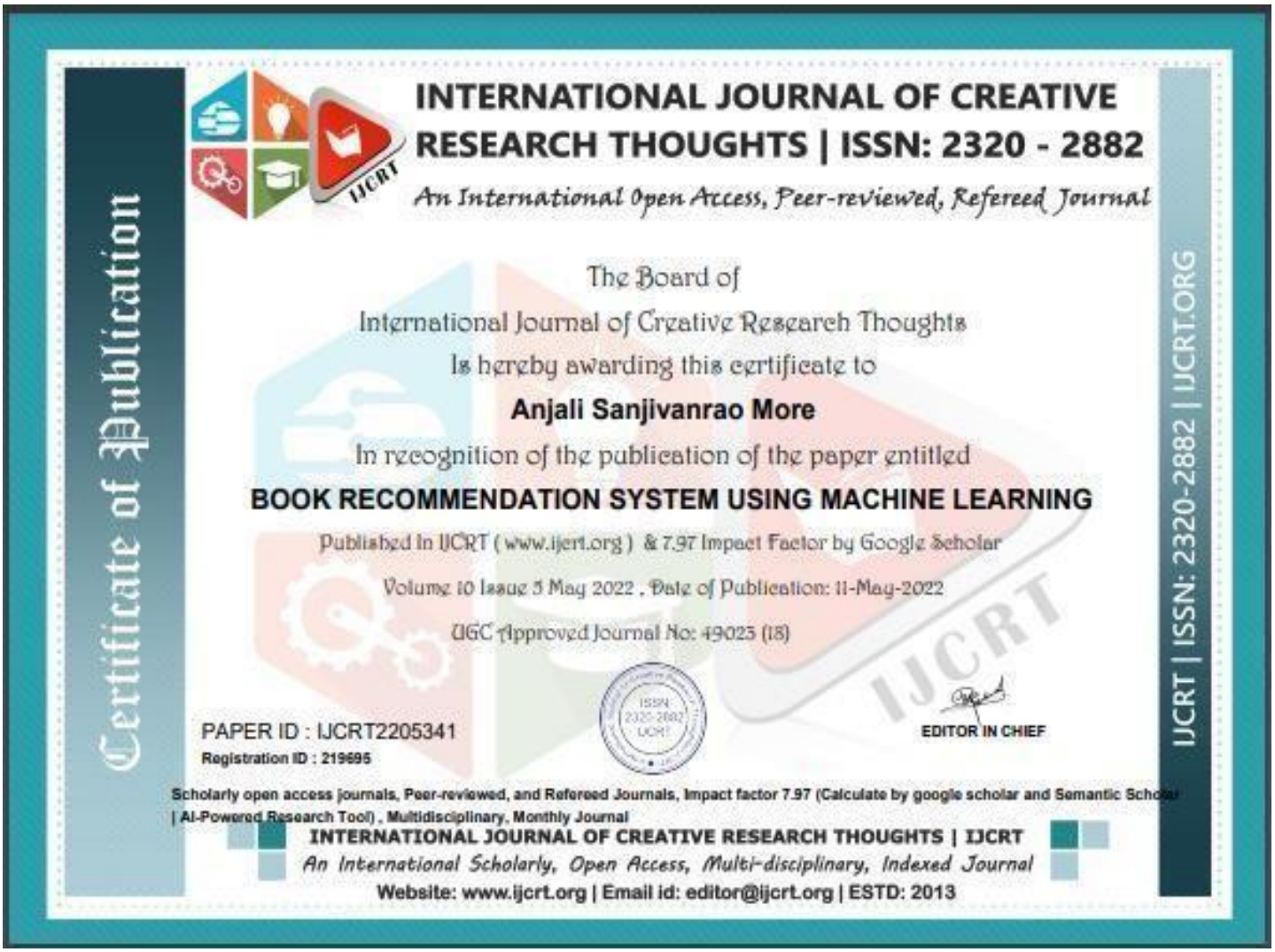

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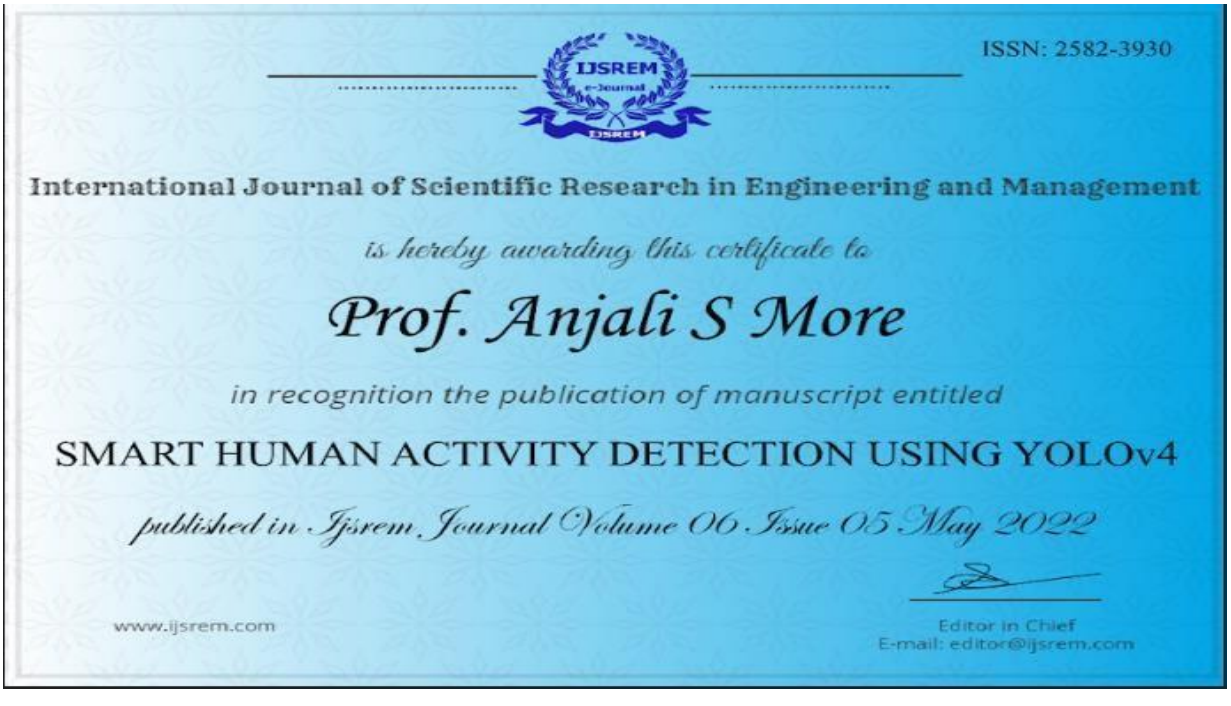

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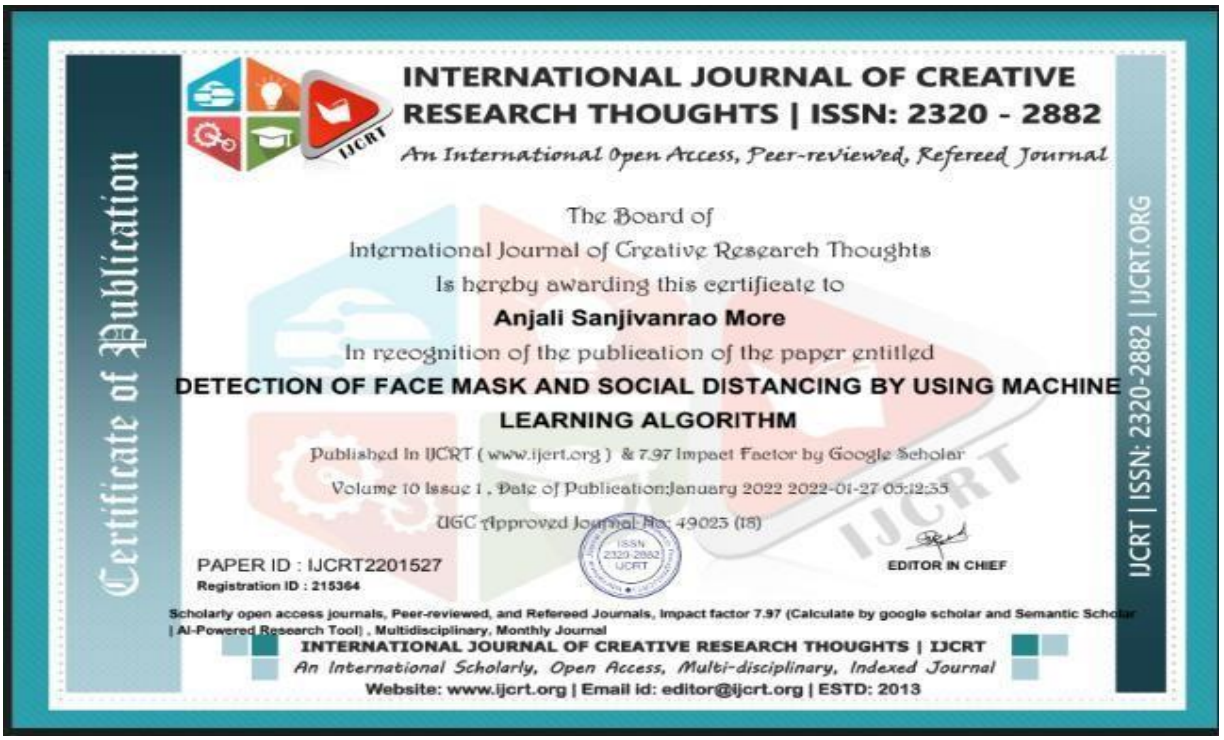

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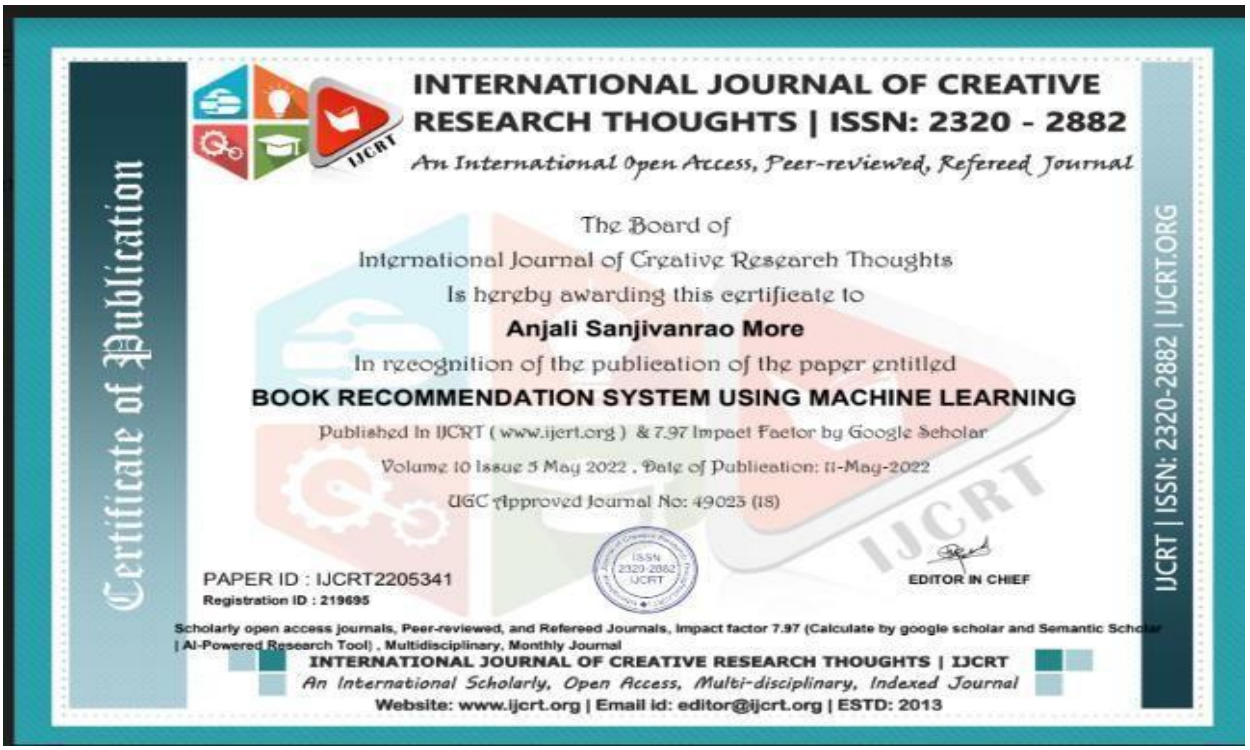

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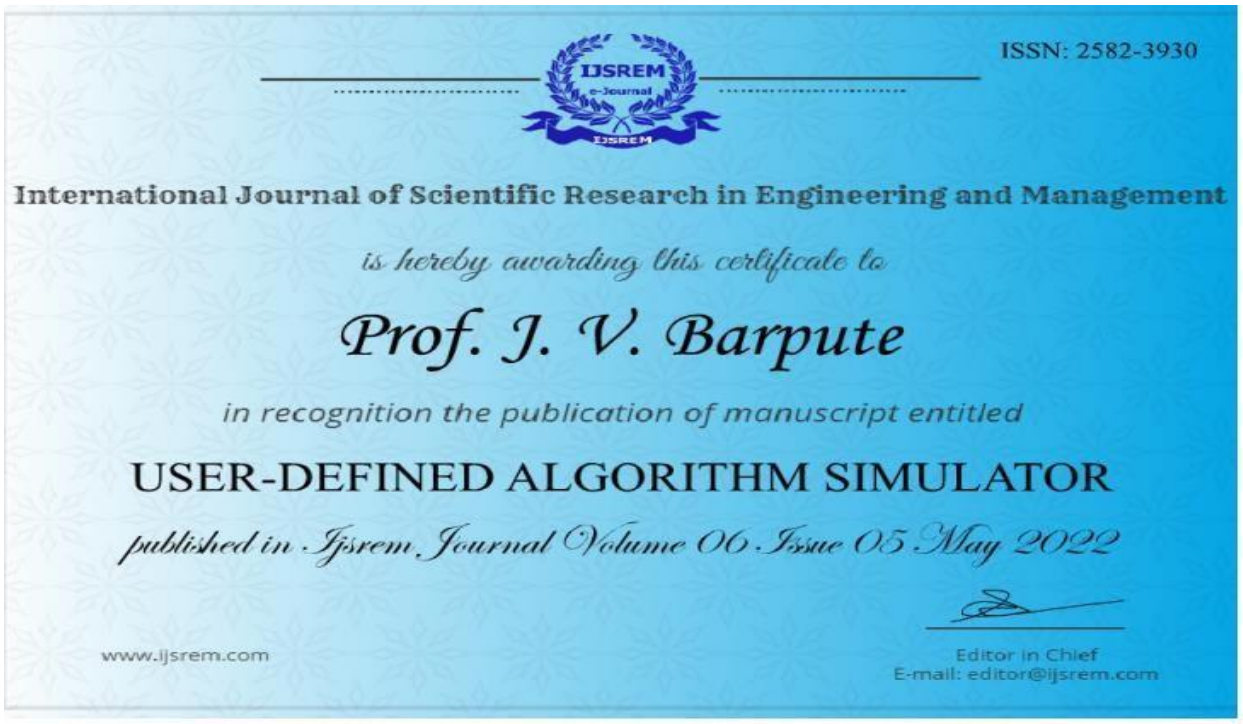

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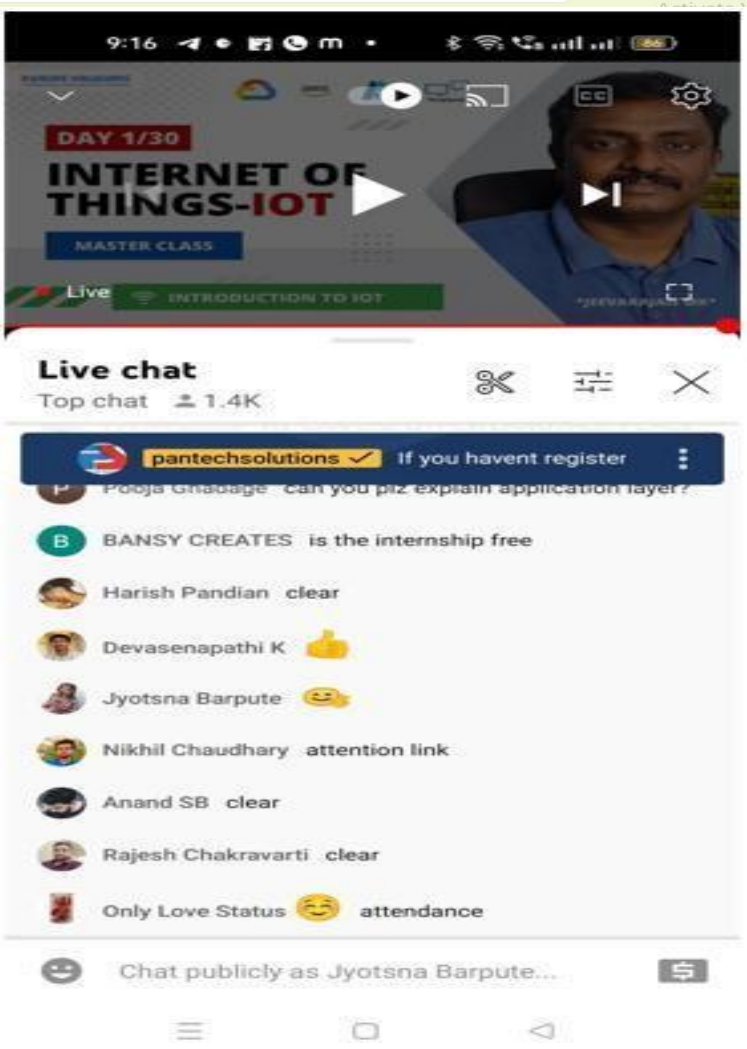

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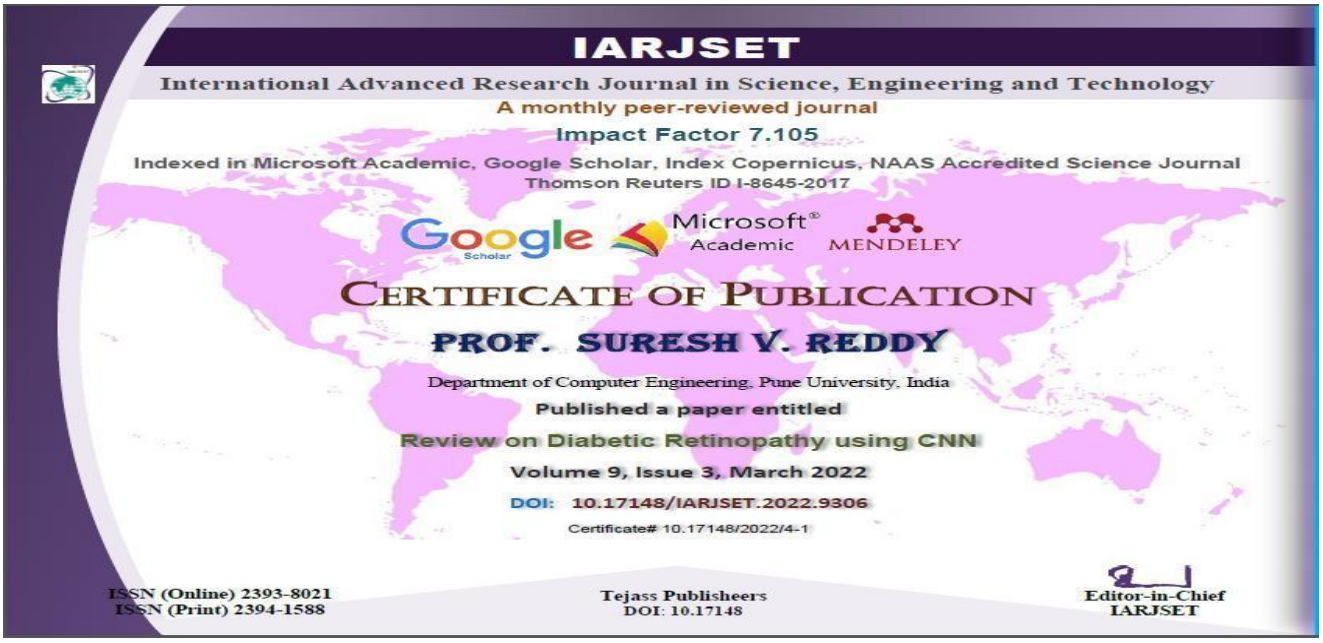

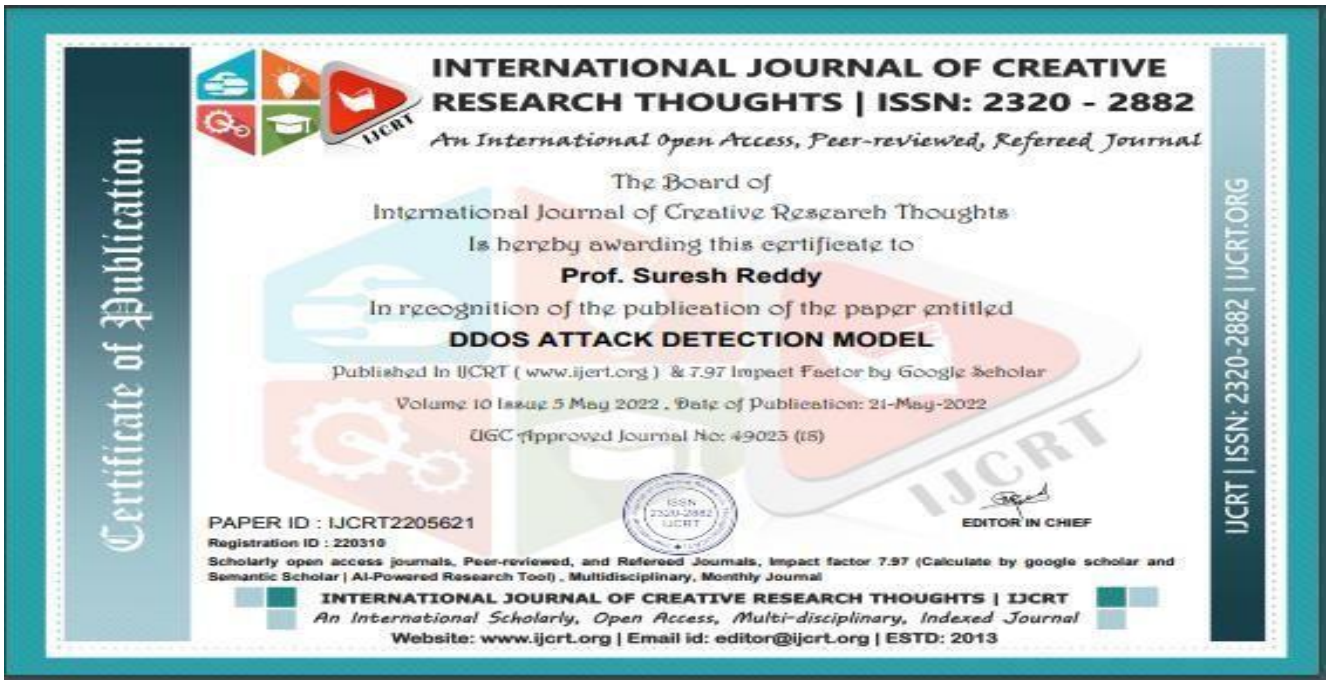

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Covease Vaccination Tracker

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ABSTRACT*:* Pandemics like Covid19 often stall the world due to their infectious nature. History has seen many such pandemics such as Plague, Ebola, Spanish flu, Zika, etc.

One major crucial factor to avoid/reduce the impact of such pandemics is the Identify, Isolate and Treat strategy. Being able to identify who has been infected, isolating them from the general public, and treating them plays a crucial role in keeping the infection to a minimum.

Covid19 came in a much modern world, where traveling is easily accessible. Combined with mass migrations of public and public spending power over vacations, The pandemic hit people hard. Even with the best Health Care infrastructure, major countries were not able to control it. The majority of the experts believe in the Identify, Isolate and Treat strategy. However, implementing that strategy with a population as big as India is tough.

This is where modern tech like Facial Recognition, GPS tracking, and Data-driven research comes to the rescue. Combining public UID(Aadhar) and Facial Recognition, we can easily keep track of public infrastructure to access key metrics like vaccination and infection rates at public places like railways, bus stops, hospitals, offices, etc.

Based on these key metrics the Public Health care body could easily access the situation and take appropriate measures.

I. INTRODUCTION

1.Introduction

Pandemics like Covid19 are disastrous for mankind. Causing major casualties, disrupting economies, loss of employment, and other sufferings that harm the general public. Controlling such infections is very crucial to avoid the waves of infections. These major waves of infections break the healthcare system, which is already overburdened in developing countries like India. In 21st Data is the new oil, For such situations, data, analytics, and intel play a very crucial role in health care administration. India has already run a huge campaign for registering the public over UIDAI (Aadhar) and most of the public is already registered into the UIDAI database. Using this as leverage and modern techs like Facial Recognition and Data-driven analytics the health care admins could access, analyze and deduce the situations to reduce casualties and potential infection waves. This system uses the power of Facial Recognition and Modern Infra to collect and track Covid related analytics information.

II. SCOPE OF WORK

1. To Design a system that tracks faces in public areas and tracks Covid related metrics using facial recognitions.
2. Provide Healthcare Admins with Appropriate metric Dashboard for metric analytics,
3. Ability to work as a separate system yet easy to integrate with other current systems.

III. MOTIVATION

a. The key motivating factor was to leverage modern tech to better access situations that could save thousands of innocent lives. Computer vision already has a huge influence over analytics, administration, and military applications.
b. Considering the developing nature of the country and the demand to modernize the Govt infra and self-reliance this seems like a perfect opportunity to come up with a solution for a very tenacious problem.

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IV. LITERATURE SURVEY

Student Attendance System using Face Recognition: The proposed system meets the objective of achieving high precision and less computational complexity. This system is cost-efficient and less manual work is needed. Using Gabor filters accuracy is highly improved.'

QR Based administration: Systems like Cowin generate QR code over-vaccination certificates thathelp admin personnel verify vaccination and allow the public into a specific place. However not all EMRs are connected to Cowin and do not trigger infection warnings.

GPS Based Peer Tracking System: GPS-based tracking was implemented in apps like Arogya setu. These apps tracked individual peers using UID and GPS. These apps required users to install an app on their phone and keep the phone and GPS powered on. Live tracking of peers did trigger some privacy concerns as the system monitored them 24*7. They do help identify users whether they came in contact with an infected person or not but the privacy concerns, required installation of the app and GPS accuracy did not seem to evaluate into meaningful data for analytics.

Acceptance of a COVID-19 Vaccine and Its Related Determinants among the General Adult Population in Kuwait: The objective of this study was to determine the acceptance of a coronavirus disease 2019 (COVID-19) vaccine among the general adult population in Kuwait and assess its determinants. ***Subjects and Methods:*** A web-based cross-sectional study was conducted by enrolling adults living in Kuwait (n = 2,368; aged ≥21 years). Acceptance of a COVID-19 vaccine was inferred if participants indicated that they "definitely or probably will accept vaccination against COVID-19 once a vaccine is available."

Medical Images and/ or Symptoms of Patient using Machine Learning Approaches:*T*he new type of coronavirus COVID-19 virus was first detected in Wuhan-China. A COVID-19 certified patient is characterized by fever, fatigue, and dry cough. The coronavirus (COVID-19) epidemic is spreading worldwide. In this review paper, a database of X-ray, CT-Scan images from patients with common bacterial pneumonia, confirmed Covid-19 infection, and common cases, were used to automatically detect Coronavirus infection. The purpose of the study was to evaluate the effectiveness of COVID-19 acquisition. During the COVID-19 scenario, the number of infected cases rises in huge number globally. Due to this fact, a vital decision had been taken by medical experts and infected patients to adopt various medical facilities within a reasonable amount of time.

V. METHODOLOGY

5.1 Introduction

Just like any other form of biometric identification, face recognition requires samples to be collected, identified, extracted with necessary (features) information, and stored for recognition. The entire face recognition solution is divided into the following major modules

1. Face Capture
2. Face Detection
3. Face Recognition

5.2 Algorithm

Summary: The CovEase server consumes image feed from tracking clients and processes the images. The workflow for face detection is as follows.

- Consume Images from Camera Client.
- Convert and Read images into an appropriate image format.
- Detects the location of Face and Extract Face from the image.
- Derive face embedding data like distances between eyes, nose, lips, sizes, etc from the Face Recognition Landmarks.
- Compare the embeddings and find the closest match.

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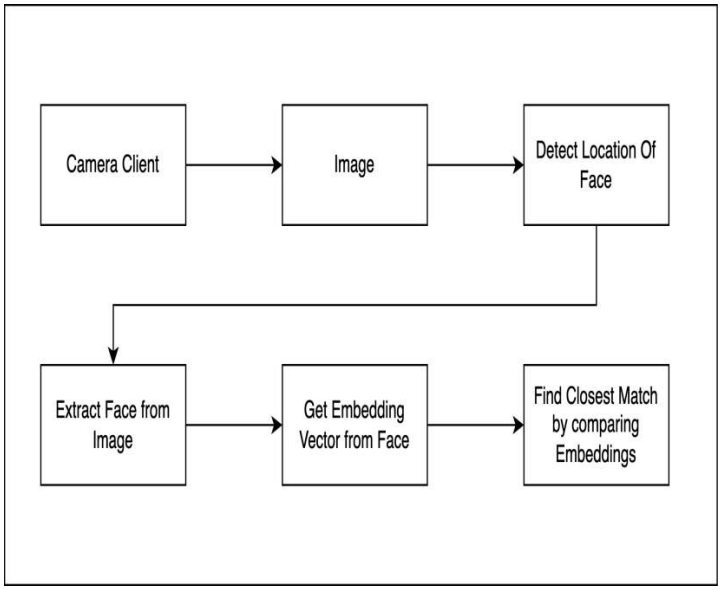

Fig.1.Face Recognition Workflow

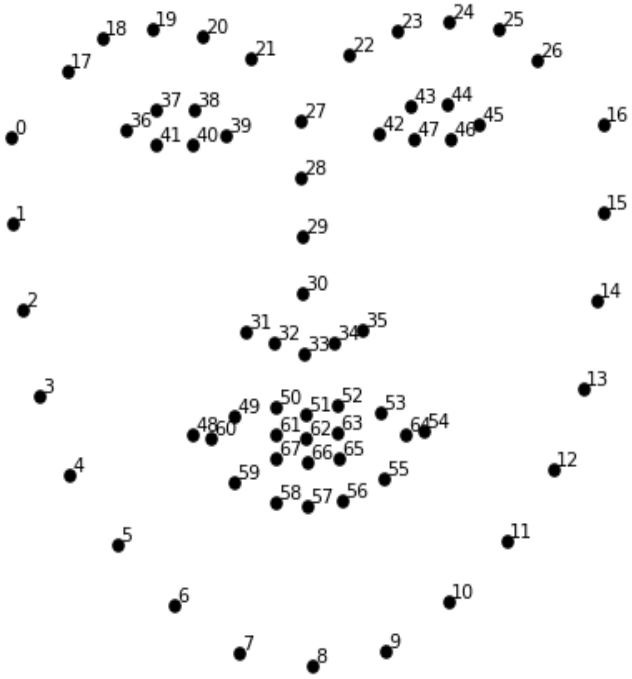

Fig.2 Face Recognition Landmarks

5.3 Face Detection

Face Detection is the fundamental step in any of the operations carried out in the face recognition process. The Haar Feature-based Cascade Classifier is a widely used mechanism for detecting faces. In order to train a classifier to detect faces, two large sets of images are formed, with one set containing images with faces, and the other set without. These images are then used to generate classifier models. The classifier is generated by extracting Haar features from the positive and negative images

A Haar classifier is based on an object detection framework proposed by Paul Viola and Michael Jones in their paper, "Rapid object detection using a boosted cascade of simple features." A single classifier is trained using each feature shown in the illustration below. However, a single classifier alone does not produce high accuracy, and so multiple

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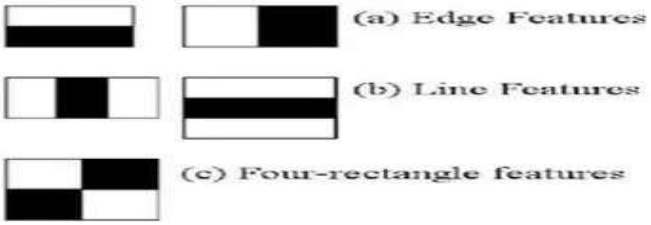
such classifiers are cascaded. The final classifier formed is a weighted sum of weak classifiers. Using this method, the classifier provides a classification accuracy of more than 95%.



5.4 Face Recognition

Face detection went mainstream in the early 2000s when Paul Viola and Michael Jones invented a way to detect faces that were fast enough to run on cheap cameras. However, much more reliable solutions exist now. We're going to use a method invented in 2005 called Histogram of Oriented Gradients — or just HOG for short.

A HOG is a feature descriptor generally used for object detection. HOGs are widely known for their use in pedestrian detection. A HOG relies on the property of objects within an image to possess the distribution of intensity gradients or edge directions. Gradients are calculated within an image per block. A block is considered as a pixelgrid in which gradients are constituted from the magnitude and direction of change in theintensities ofthe pixel within the block.

In the current example, all the face sample images of a person are fed to the feature descriptor extraction algorithm; i.e., a HOG. The descriptors are gradient vectors generated per pixel of the image. The gradient for each pixel consists of magnitude and direction, calculated using the following formulae:

$$g = \sqrt{g_x^2 + g_y^2}$$

$$\theta = \arctan \frac{g_y}{g_x}$$

In the current example, Gx and Gy are respectively the horizontal and vertical components of the change in the pixel intensity. A window size of 128 x 144 is used for face images since it matches the general aspect ratio of human faces. The descriptors are calculated over blocks of pixels with 8 x 8 dimensions. These descriptor values for each pixel over 8 x 8 block are quantized into 9 bins, where each bin represents a directional angle of gradient and value in that bin, which is the summation of the magnitudes of all pixels with the same angle. Further, the histogram is then normalized over a 16 x 16 block size, which means four blocks of 8 x 8 are normalized together to minimize light conditions.

Now we will come up with 68 specific points (called landmarks) that exist on every face the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc. Then we will train a machine-learning algorithm to be able to find these 68 specific points on any face.

5.5 Mathematical Model

Let 'S' be the system
Where,
Set of input, set of output
P=Set of technical processes
Fs=Set of Failure State
Ss=Set of Success State
Identify the Input Data l1,l2…ln
I = (Input Data (Text, Image), Dataset (Face encodings))
Identify the output applications as O1, O2,...On (Face Recognition)
Identify the Process as P
P = (Image pre-processing, Face Detection, HOG feature extraction, Face encoding evaluation, Classification, show result)
Identify the Failure state as Fs
Fs = (If data set not loaded, If not predicted if more time required to predict
• Identify the Success state as Ss

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P = (Correct prediction within time)

VI. RESULT ANALYSIS

6.1 Introduction

Live detection system provides an edge over manual or heuristic efforts, as the system is purely data-driven, The extracted information could potentially save thousands of lives. The ability to keep track of public infrastructure to access key metrics like vaccination and infection rates at public places like railways, bus stops, hospitals, offices, etc could be done on a scale across the world.

Based on these key metrics the Public Health care body could easily set up crucial protocols to access, analyze and diffuse the various hazardous situations. This system can also serve as a base to data drive facial governance systems.

6.2 Application

- Live Pandemic analysis
- Historical data analysis
- Face detection based e-Governance

6.3 Advantages

- Ease of tracking and accurate information with minimal human intervention.
- Live metrics that help reduce health care task force decisions.
- Ease of onboarding UIDs from external systems.
- Ability to download processes and analyze data from the system.

6.4 Limitations

- The system is dependent on multiple tracking client cameras and a powerful Server system that requires a modern GPU. Thus is a big initial investment to the infrastructure.
- Due to its nature, the system might generate noise in the data which the analytics team would need to mitigate.
- The system might trigger privacy concerns due to lack of laws over computer vision in India.

VII. CONCLUSION

Face tracking systems like CovEase would help mitigate not only Covid19 infection waves but also other infectious diseases that might occur in the future. This system also serves as a base model for all other face detection-based e-Governance systems.

Currently, the system is a monolithic server that could be separated and distributed horizontally to optimize it further. Analytics plugins could be built into the system to help the Admin view the metric better.

REFERENCES

1. Analysis of COVID-19 Tracking Tool in India: Case Study of AarogyaSetu Mobile Application, 2020 ACM Digital Library Rajan Gupta, Manan Bedi, Prashi Goyal, Srishti Wadhera, Vaishnavi Verma
2. Digital Documentation of COVID-19 Certificates: Vaccination Status, 2020 WHO
3. Student Attendance System using Face Recognition 2020 IEEE Samridhi Dev, Tushar Patnaik
4. Face Recognition Based Smart Attendance System 2020 IEEE Arjun Raj A, MahammedShoheb, Arvind K, Chethan K S.
5. Real-Time Object Detection and Tracking Using Deep Learning and OpenCV
2018 IEEE Chandan G, Ayush Jain, Harsh Jain, Mohana.
6. Sentimental Analysis of "AarogyaSetu" 2021 IEEE Illa Garg, Dr. Deepti Kiran, Atisha Sharma.
7.Acceptance of a COVID-19 Vaccine and Its Related Determinants among the General Adult Population in Kuwait,YosorAlqudeimatDeemaAleneziBedourAlHajriHebaAlfouzan
Zain Almokhaizeem Saba Altamimi Waleed Almansouri Sayed Alzalzalah Ali H. Ziyab.
8.Medical Images and/ or Symptoms of Patient using Machine Learning Approaches, Akshay Kumar Siddhu, Dr. Ashok Kumar and Dr. Shakti Kundu.
9.Analysis and prediction of COVID-19 Pandemic in India, Manish Chawla, Rohit Khattar. 10.Computer Vision and Radiology for COVID-19 Detection, RavneetPunia, Lucky Kumar, Mohd. Mujahid, Rajesh Rohilla.

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SMART HUMAN ACTIVITY DETECTION USING YOLOv4

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ABSTRACT: Smart Human Activity Detection using YOLOv4 is a commanding research area in computer vision due to its numerous applications such as person surveillance, social distancing detection, object detection, etc. A simple activity recognition model can allow a single human person to monitor all our surroundings to ensure safety and privacy while preserving maintenance cost and efficiency with a high level of precision. This technique uses bounding boxes to highlight the action. The monitoring system with real-time video surveillance can deploy for patients and the elderly in a hospital or nursing home and various human activities in essential areas such as the airport. For speedy analysis of action and accurate results, while working with complex human behavior, we decided to use the YOLOv4 (You Only Look Once) algorithm, the latest and fastest among them all. This model detected and recognized multiple patients or other regular person activity and multiple human activities tracing support at once. To see human activity, a CNN model has been pre-trained. The accuracy of convolutional neural networks is typically 79-90% when used to detect actions by adding pooling and convolution layers, followed by a few fully connected layers and recognizing patterns in an interval. It is estimated to provide an accuracy of 79-90%. Applications include surveillance and observation with the proposed system. This paper helps detect moderate human activity using YOLOv4 and Darknet techniques.

KEYWORDS- YOLOv4, DarkNet, Nvidia GPU Driver

I. INTRODUCTION

Human activity recognition is the study that includes correctly identifying activities performed by humans, tested in different ways. Human activity is the continuous flow of single or distinct action essential in progression. Some human activity specimens are a sequence of steps in which a subject enters a room, walks forward, sits down, stands up, etc. Human activity recognition can widely apply to some real-world applications like patient monitoring, surveillance of essential locations, activity-based search, etc. You can perform it at various abstract levels. Students, engineers, and students have studied human activity recognition in every part of the world for a long time. The Machine Learning-based activity recognition uses Computer vision techniques like YoloV4 and DarkNet to recognize activities performed by humans. We will mainly be focused on the various activities and detect these actions through video. The Human Actions recognized in the videos are based on analyzing a sequence of video frames using a computer to find human activities without manual operations automatically. In this paper, we will be using the YOLO (You Only Look Once) library to build a system that will detect human activities. YOLOv4 is four-time faster, and not only that, we can change between faster speed and better accuracy by just changing the amount and data for the model, without any additional retraining of data required. Human Action Recognition is an area of computer vision research and applications. The goal of Human Action Recognition is to identify and understand people's actions.

II. MOTIVATION

Understanding human activity and their interaction with surrounding objects are crucial for developing an intelligent system. Human action recognition is a field that deals with the problems generated in the integration of sensing and reasoning to provide context-aware data that can confer personalized support across an application. Several issues still plague human action recognition. Such as privacy concerns regarding continuous monitoring of activities, difficulty in performing HAR (Human activity recognition) in real-time, and lack of entirely ambient systems able to reach users at any time. Human activity recognition is a very critical monitoring system. Human action detection aims to inspect exercises from video successions or still pictures. The continuous improvement of artificial intelligence and deep learning algorithm helps us transmit and get vital physiological signs to the medical personnel and simplifies the quantification. As a result, it raises the efficiency of the patient monitoring system. A human activity recognition system can enhance the patient's experience in the medical sector.

Additionally, we can use the technology in many other fields. The active or innovative system can use HAR technology to monitor its residential area for better security. Our research aims to offer medical support, well-being services, and health benefit to older adults and other security purposes for critical infrastructure. It was exciting because we were about to create an intelligent system that would detect human activity and monitor that activity intelligently. That's why we decided to take the challenge.

III. PROBLEM STATEMENT

HAR must recognize human activities by training a machine learning model and displaying activity results per the input activity received from the camera input/video. With this automated Human Activity Detection system, doctors can observe multiple patients simultaneously from their chamber or comfort zone. Doctors also can keep an eye on the duty nurse or staff in the patient's cabin. What are they doing, and are they doing their duty perfectly? It can also use the same system for many different purposes mentioned above. In this paper, we implement the Human Activity Detection system in both still images and video with mentioned three human actions. Further processing, we will be adding more action types. Adding more action types will add more variety.

IV. LITERATURE SURVEY

4.1 Human Activity Analysis using Machine Learning Classification Techniques:

(Zameer Gulzar, A.Anny Leema, I.Malaserene, December-2019)

In recent times, smartphones have played a vital role in recognizing human activities and have become a well-known field of research. This article provides a detailed overview of various research papers on human activity recognition. The data chosen is multivariate, and we have applied different machine classification techniques Random Forest, KNN, Neural Network, Logistic Regression, Stochastic Gradient Descent, and Naïve Bayes, to analyze human activity. Feature selection reduces the dataset's dimension in addition to building AI models. We calculated precision and recall and made a Confusion Matrix for each model. Experiment results proved that the Neural Network and logistic regression provide better accuracy for human activity recognition than other classifiers such as k-nearest neighbor (KNN), SGD, Random Forest, and Naïve Bayes. However, they take higher computational time and memory resources.

4.2 Real-Time Object Detection using YOLO:

(Upulie H.D.I, Lakshini Kuganandamurthy, May-2021)

With the availability of enormous amounts of data and the need to computerize visual-based systems, research on object detection has been the focus for the past decade. Since 2012, the growth of Convolutional Neural Networks (CNN) has accelerated this need. With various CNN network architectures available, the You Only Look Once (YOLO) network is famous for many reasons, mainly its speed of identification applicable in real-time object identification. This paper reviews the fundamental structure of CNN algorithms. An overview of YOLO's real-time object detection algorithm and architecture models can remove highlights and discover objects in each given image. These models can solve deformity identification, instructive/ learning application creation, etc.

4.3 Latest Research Trends in Fall Detection and Prevention Using Machine Learning:

(Sara Usmani, Abdul Saboor, Muhammad Haris, Muneeb A. Khan, Heemin Park, July-2021)

Falls are unusual actions that cause a significant health risk among older people. The growing percentage of old age people requires urgent development of fall detection and prevention systems. The emerging technology focuses on developing such strategies to improve quality of life, especially for the elderly. A fall prevention system tries to predict and reduce the risk of

falls. In contrast, a fall detection system observes the fall and generates a help notification to minimize the consequences of falls. Many technical and review papers exist in the literature with a primary focus on fall detection.
Similarly, several studies are relatively old, focusing on wearables only, and use statistical and threshold-based approaches with a high false alarm rate. Therefore, this paper presents the latest research trends in fall detection and prevention systems using Machine Learning (ML) algorithms. It uses recent studies and analyzes datasets, age groups, ML algorithms, sensors, and location. Additionally, it provides a detailed discussion of the current trends of fall detection and prevention systems with possible future directions. This overview can help researchers understand the existing systems and propose new methodologies by improving the highlighted issue.

4.4 A New Video-Based Crash DetectionMethod: Balancing Speed and Accuracy Using a Feature Fusion Deep Learning Framework:

(Zhenbo Lu, Wei Zhou, Shixiang Zhang, Chen Wang, November-2020)

Quick and accurate crash detection is essential for saving lives and improved traffic incident management. This paper developed a feature fusion-based deep learning framework for video-based urban traffic crash detection tasks to balance detection speed and accuracy with a limited computing resource. A residual neural network (ResNet) changed into mixed with interest modules as a part of this framework. To extract crash appearance features from urban traffic videos (i.e., a collision appearance feature extractor), which then used to feed into a spatiotemporal feature fusion model, Conv-LSTM (Convolutional Long Short-Term Memory), to simultaneously identify appearance (static) and motion (dynamic) crash features. +e proposed version changed into trained through a set of videos masking 330 crashes and 342 non-crash activities. In general, the proposed model achieved an accuracy of 87.78% on the testing dataset and an acceptable detection speed (FPS > 30 with GTX 1060). +anks to the attention module, the proposed model can capture crashes' localized appearance features (e.g., vehicle damage and pedestrian fallen-off) better than conventional convolutional neural networks. +e Conv-LSTM module outperformed conventional LSTM in capturing motion features of crashes, such as the roadway congestion and pedestrians gathering after hits. Compared to the traditional motion-based crash detection model, the proposed model achieved higher detection accuracy. Moreover, it could detect crashes much faster than other feature fusion-based models (e.g., C3D). +e results display that the proposed model is a promising video-based urban visitors crash detection set of rules that might use in practice within the destiny.

V. METHODOLOGY

Human activity detection plays an essential role in this modern technology era. It's a large field for research. Nowadays, it has become a rising topic in the human interaction area. For the past decades, many researchers have been working on this topic. Computers don't have the brain to detect anything. They can't read the humans mind. They only give us the output for what we trained for them. If the computer can understand the activity of humans, it can bring a lot of positive changes in the field of IoT. Nowadays, HAR is creating big chaos in the technology field. Methodology of Human Activity Recognition includes several processing steps: taking the input, identifying similar patterns, comparing the frames with the Coco dataset, recognizing the video frames' actions, and detecting those actions using Cnn. Our thesis and research topic is "Human Activity Recognition ."It can be interacted with and implemented with the various algorithms & fields of deep learning, machine learning, Image processing, and neural network. We will use the python programming language to implement our algorithm. We use the YOLOv4 approach for better and faster detection. We use Google Colab for free and quick GPU acceleration, speeding up the data training.

5.1 Data Collection Procedure

We had to collect a lot of data in different conditions, complex backgrounds, surroundings, the hospital, and another environment. So that this proposed work can give us the best accuracy at any location, we divide into different groups. We try to capture as much data as possible divided into three groups.

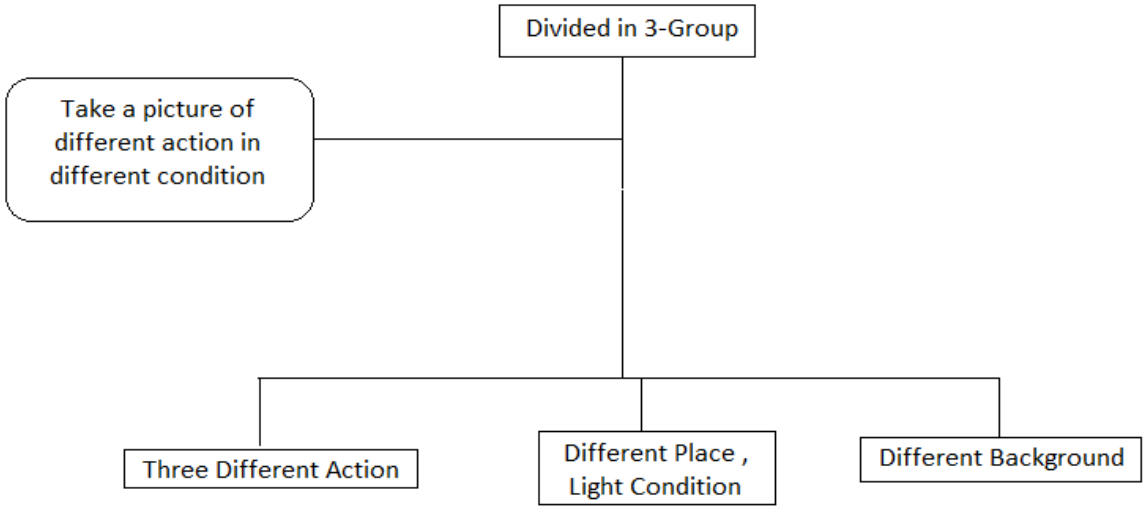


Fig 5.1: Data collection process

5.2 Capturing the Frames

The human actions accomplished in a very video enter area unit divided into frames at positive intervals of your time. These frames are captured and taken as input to the CNN model to identify similar patterns by pooling them into certain classes of actions.

5.3 Dataset

A Coco dataset consisting of 400 human activities is employed to predict and compare the input data. From youtube recordings, they take the coco datasets. The activities are human focuses and cover a broad scope of classes. It includes human-object communications, such as mowing the lawn, washing dishes, and human actions. For example, e.g., Since the dataset is vast and downloading each clip would be a waste of time, we already have pre-trained models by the original author. It will be easier and provide accurate results when working on the pre-trained model than training and tuning it separately.

5.4 YOLO detection architecture

In this topic, we will discuss further YOLOv4 along with the architecture. All of the YOLO data models are activity/object detection datasets, and the training is given to those datasets to search for a subset of the object class.

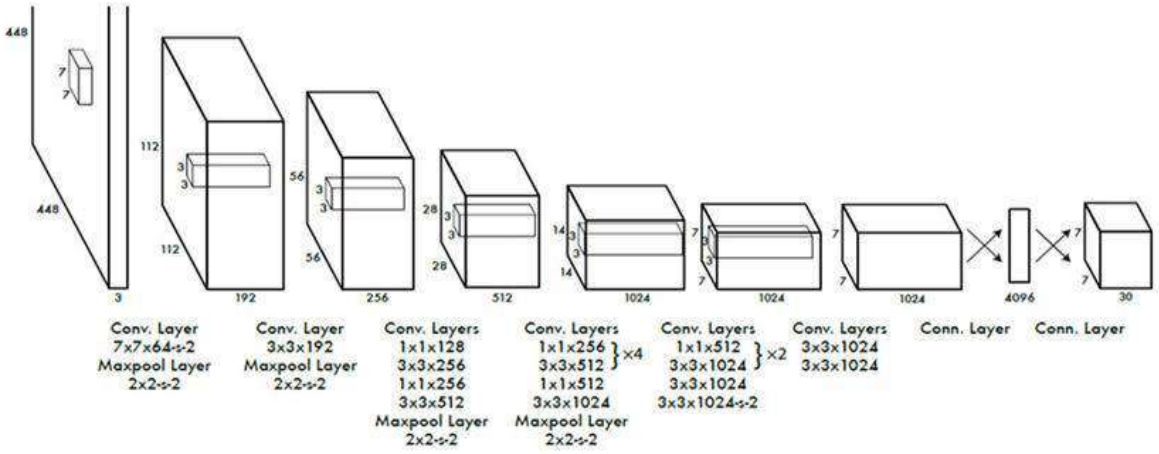


Fig 5.4: YOLO Cnn Architecture

(Retrieved from: https://shortest.link/2kw2)

Most people in the research field are still used to the YOLOv3, which gives us an excellent result. But the YOLOv4 had improved the fidelity and momentum of the two main attributes we generally use to qualify how the architecture and algorithms perform. The YOLOv4 is a further improved approach to object detection, and this applies a single CNN to an entire frame collected from video or just captured by a camera into the grid.

5.5 Recognition of the Action

The DarkNet model uses the Coco dataset to compare similar patterns in the input data frames captured in the intervals. CNN can identify similar patterns through pooling layer by layer, and the specified actions assort into classes of human activities.

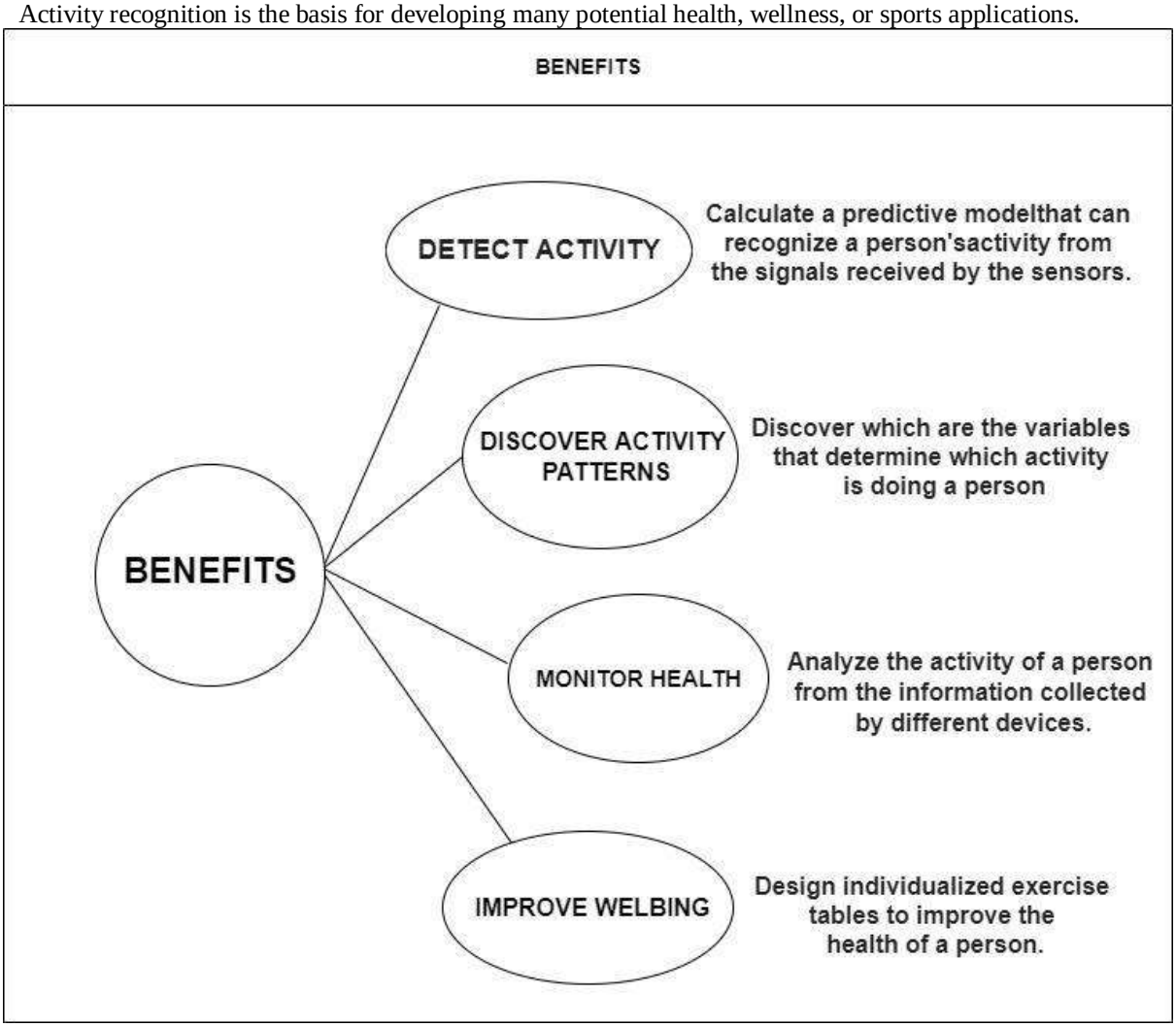
VI. KEY FUNCTIONS

Pre-trained: To recognize human actions, the model is pre-trained.
Feature Extraction: Similar patterns are identified based on the image frame captured.
YOLOv4: For Real-Time Object Detection.
DarkNet: For making Real-Time predictions.

VII. OTHER SPECIFICATION

7.1 Benefits

Activity recognition is the basis for developing many potential health, wellness, or sports applications.



VII.2 Limitations

1. Many Data Required
2. Too many Activity trains overlap the detection.
3. Require very high-performing GPU and CPU for local PC tests.

VII.3 Applications

1. This HAR system is handy for a health monitoring system.
2. As a surveillance system it can provide intelligence.
3. TI Applications can also use it.

VIII. CONCLUSION

In this paper, the proposed report focuses on Computer Vision to predict the activities of the action on videos. It focuses on recognizing simple activities like normal ones using image processing techniques. This proposed work will provide the required drive for efficiently identifying human action in real-time. We assessed a continuous methodology for human movement identification, picture arrangement dependent on YOLOv4 (You Only Look Once) from complex scenes. The techniques approved with our challenging dataset there are many jumbles and uproarious information for checking more exactness. It can recognize more than one individual's various exercises utilizing additional jumping encloses a solitary picture. In the future, we are planning to add more features in this proposed work that would make this more usable and would revolutionize the human activity monitoring system. Throughout every framework, there is an opening for future development. In the future, this framework will be quicker and more productive, and diminishing handling time is one of the significant issues.

IX. FUTURE WORK

Activity recognition is the basis for developing many potential health, wellness, or sports applications.
Collecting various devices' information for health monitoring can be done by analyzing a person's activity.HAR is used to discover similar patterns, which are the variables that determine which action the human performs.HAR can be used for robotic automation, making it easier to train a robot to interact with humans and objects. The appliance of prediction in this proposed work makes it more usable and useful for security purposes. Our future work also focuses on finding a metric to help the action recognition complete within a few frames. Thus the classification stops automatically for the particular action. We will also focus on improving action recognition with the help of object detection in brackets so that it can detect more complex human activities. Movement of objects or Euclidean distance between centers of moving objects and humans can also provide more information about activities occurring in the video.

X. REFERENCES

[1] Redmon, J., 2020. *YOLO: Real-Time Object Detection*. [online] Pjreddie.com. Available at: <https://pjreddie.com/darknet/yolo/> (J) [Accessed 6 December 2020].
[2] “Data Generated by new surveillance cameras to increase exponentially in the coming years." [Online, Accessedon 12 March 2018]. http://www.securityinfowatch.com/news/12160483/data-generated-by-new-surveillance-cameras-to-increase-exponentially-in-the-comingyears
[3] J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You Only Look Once: Unified, Real-Time Object Detection," 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Las Vegas, NV, 2016, pp. 779-788. DOI: 10.1109/CVPR.2016.91
[4] C Wolf, J. Mille, E. Lombardi, O. Celiktutan, M. Jiu, E. Dogan, G. Eren, M. Baccouche, E. Dellandrea, C.-E. Bichot, C. Garcia, B. Sankur, Evaluation of video activity localizations integrating quality and quantity measurements, In Computer Vision and Image Understanding (127):14-30, 2014.
[5] Limin Wang, Yu Qiao, and Xiaoou Tang. Action recognition with trajectory-pooled deep-convolutional descriptors. In CVPR, pages 4305– 4314, 2015.
[6] Simonyan, Karen & Zisserman, Andrew. (2014). Two-Stream Convolutional Networks for Action Recognition in Videos. Advances in Neural Information Processing Systems.
[7] Roberts Damaševičius, Mindaugas Vasiljevas, Justas Šalkevičius, Marcin Woźniak, "Human Activity Recognition in AAL Environments Using Random proposed workions," Computational and Mathematical Methods in Medicine, vol. 2016, Article ID 4073584, 17 pages, 2016
[8] Vrigkas M, Nikou C and Kakadiaris IA (2015) A Review of Human Activity Recognition Methods. Front. Robot. AI 2:28. DOI: 10.3389/front.2015.00028
[9] Vishwakarma S, Agrawal A. A survey on activity recognition and behavior understanding in video surveillance. Vis Comput. 2013;29(10):983–1009.
[10] Bayat A, Pomplun M, Tran DA. A study on human activity recognition using accelerometer data from smartphones. Procedia Comput Sci. 2014;34:450–7.

[11] Radu V, Lane N. D, Bhattacharya S, Mascolo C, Marina M. K, Kawsar F. Towards deep multimodal learning for activity recognition on mobile devices. In: Proceedings of the 2016 ACM international joint conference on pervasive and ubiquitous computing: adjunct. ACM; 2016, September. pp. 185-188.
[12] Moya Rueda F, Grzeszick R, Fink G, Feldhorst S, ten Hompel M. Convolutional neural networks for human activity recognition using body-worn sensors. In: Informatics, Vol. 5, No. 2. Multidisciplinary Digital Publishing Institute. 2018. p. 26.
[13] Zeng M, Nguyen L. T, Yu B, Mengshoel O. J, Zhu J, Wu P, Zhang J. Convolutional neural networks for human activity recognition using mobile sensors. In: 6th International conference on mobile computing, applications, and services. IEEE; 2014, November. pp. 197-205.
[14] Raptis M, Sigal L. Poselet key-framing: a model for human activity recognition. In: Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition. 2013. pp. 2650-2657.
[15] Redmon J, Farhadi A. YOLO9000: better, faster, stronger. In: Proceedings of the IEEE conference on computer vision and pattern recognition. 2017. pp. 7263-7271
[16] Vishwakarma S, Agrawal A. A survey on activity recognition and behavior understanding in video surveillance. Vis Comput. 2013;29(10):983–1009.
[17] Katrina V, Zervakis M, Kalaitzakis K. A survey of video processing techniques for traffic applications. Image Vis Comput. 2003;21(4):359–81.
[18] Roboflow Blog. 2020. Breaking Down Yolov4. [online] Available at: [Accessed 6 December 2020].
[19] Bayat A, Pomplun M, Tran DA. A study on human activity recognition using accelerometer data from smartphones. Procedia Comput Sci. 2014;34:450–7.
[20] Medium. 2020. Introduction To Yolov4: Research Review. [online] Available at: [Accessed 6 December 2020].
[21] Medium. 2020. YOLO — You Only Look Once, Real-Time Object Detection Explained. [online] Available at: [Accessed 6 December 2020]
[22] Redmon, J. and Farhadi, A., 2020. Yolov3: An Incremental Improvement. [online] arXiv.org. Available at: [Accessed 6 December 2020]
[23] T. Choudhury, S. Consolvo, B. Harrison, J. Hightower, A. LaMarca, L. LeGrand, et al., "The mobile sensing platform: An embedded activity recognition system," IEEE Pervasive Computing, vol. 7, no. 2, pp. 32-41, 2008
[24] G.Akilandasowmya, P.Sathiya, P.AnandhaKumar Human action recognition in the research area of computer vision, IEEE International Conference on automatically detect and retrieve semantic events in the video, 2015 Seventh International Conference on,15-17 Dec.2015
[25] Arie et al. Human activity recognition using multidimensional indexing IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume: 24, Issue: 8, Aug 2002.

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DETECTION OF FACE MASK AND SOCIAL DISTANCING BY USING MACHINE LEARNING ALGORITHM

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Abstract: In this ongoing crisis, it's a necessity for wearing a face mask and maintain social distance. This paper provides the literature assessment on Face-Mask and Social Distancing. The successive part deals with the proposed YOLO and CNN machine learning algorithms. According to the World Health Organization guidelines, every individual should accompany proper social distancing, and wear a face mask. These safety protocols will be worthy for endeavor against the present pandemic. The proposed technical study can help keep track of the social distance and detect unmasked individuals. This paper uses machine and deep learning algorithms like YOLOv3 (You Only Look Once, version 3) and CNN (convolutional neural network) algorithms. This paper uses a CNN algorithmic rule that takes an input image for recognition, pre-processes the image, classifies the image, and detects faces. The pre-processing is essential in a CNN is slightly lesser than as compared to different classification algorithms of machine learning. The YOLO algorithmic rule is popular for the Detection of an Object and Tracking of an Object. In this paper, the YOLOv3 algorithmic rule is employed to calculate the distance between every individual. The proposed technical study in this paper deals with the technology which will pass a voice instruction to those who are not following any of the safety guidelines for the current scenario.

Index Terms **- YOLO (You Simply Look Once), CNN (Convolutional Neural Network), COVID-19, Face-Mask, Social Distancing, Machine Learning.**

I. INTRODUCTION

With the present-day outburst and lively transmission of the COVID-19 infectious disease, it necessitates for every individual should pay attention to sustain social distancing norms and wear a face mask to lessen the widespread transmission of novel coronavirus. Every individual should follow appropriate social distancing. Each individual at public gatherings must requisite to have at least a 3feet or 1meter distance between each other to bring down the contiguity pass of infection [1]. And in addition, wearing a face mask brings to a halt the conveyance of infection spread by airborne droplets in the surrounding [20]. However, keeping in continuance on these guidelines is not too simple. Consciously or unconsciously, many people gather together in public places without following the guidelines. Hence to set an eye on these activities isn't an effortless duty. This paper can help keep track of the social distance and detect unmasked individuals. So the performance of many algorithms related to faces and social distancing is challenged. Therefore, this paper works with algorithms like YOLO-v3 (You Only Look Once, Version 3) real-time detection of an object that points out particular objects in videos, live feeds, or images [4]. Object classification systems are utilized by Artificial Intelligence face portrait and greyscale image, and train the CNN to extract options for classification.

- **PROPOSED WORK OBJECTIVE**

Due to Covid-19 disease, the proposed work in this paper can assist every individual with proposed work principles. The proposed technical study deals with the objectives such as maintaining Covid-19 guidelines, distinguishing unmasked and masked persons, calculating the distance among each person, and correspondingly displaying the notification for sanitizing. These important objectives are targeted to control COVID 19 to some extent.

- **MOTIVATION OF WORK**

Day by day there is adding up of COVID-19 cases[19] and additionally, there is also a rise in the range of COVID-19 tests which provides a lot of information regarding the epidemic unfold, which can cause the chance of surrounding it to prevent additional infections [21]. Therefore, following the guidelines and taking care is the prior duty of each individual. It's determined that several individuals don't follow the guidelines in many public places. Therefore, to overcome such issues the study in this paper is intended to detect people who are unmasked and even calculate the distance between every individual to maintain social distance rule for safety measures. The proposed work also deals with the additional task of notification of sanitizing hands.

II. RELATED WORK

Sr. No.	Title of Paper and Year	Methodology	Findings
1.	Face Mask Detection System- 2020 [5]	OpenCV, MobileNetV2	It defines architecture in two phases and the face mask detection is done in video streams by using some deep learning methods to get proper accuracy [5].
2.	MASK R-CNN for Pedestrian Crosswalk Detection and Instance Segmentation.- 2020 [8]	R-CNN (faster CNN technique)	Two-stage process, the first stage is (RPN) Region Proposal Network, and the second stage is similar to the prediction of class and box offset, each region of interest (RoI) is given a binary mask by Mask R-CNN [8].
3.	Social Distancing Detection with Deep Learning Model.- 2020 [12]	Deep YOLO method and computer vision techniques [12]	The distance between people can be estimated and any non-compliant pair of people will be indicated with a red frame and a red line. The proposed method was validated using a video showing pedestrians walking on a street [12].
4.	SD-Measure: A Social Distancing Detector. – 2020 [10]	Mask R-CNN	Person Detection for detecting social distancing from video footage is proposed [10].
5.	An Edge-Based Social Distancing Detection Service to Mitigate COVID-19 Propagation. 2021 [13]	GPS tracking	Three steps: a) The collection of all the GPS coordinates of users [13]. b) The computation of the distance between users, on a pair-by-pair basis [13]. c) The detection of users not respecting the distance threshold, and the warning message generation [13].

Table-1. Summary of related work

R. Sachdeva, Sonam, H. Sharma [5] have presented a method for remembrance of face masks by using Tensor-flow, Keras, OpenCV, and MobileNetV2 [5]. Here functioning is done in two phases of architecture in which, the first is the train to face mask detector using datasets for converting it into serialize classifier and another phase is to load classifier then detecting image through video then extract face and lastly apply the classifier to display output.[5]

M. A. Malbog [8] has come up with object detection for Pedestrian crosswalks by using Mask Region-Based Convolutional Neural Network (Mask R-CNN) and instance segmentation. For these 500 Pedestrian crosswalks, images were used for validation and training in which 80% images were used for the training set, and the remaining 20% images were used for the validation set [8].

Y. C. Hou, M. Z. Baharuddin, S. Yussof, and S. Dzulkifly [12] has put forward detection of social distancing by using Deep learning methods to evaluate the distance between people through a pre-recorded video feed. For object detection pre-trained model is based on the YOLOv3 algorithm which is used to employ pedestrian detection [12].

S. Gupta, R. Kapil, G. Kanahasabai, S. S. Joshi, A. S. Joshi [10] has proposed detecting social distancing from video footage. The Mask R-CNN deep learning algorithm is used for the detection of the objects. To have excessive correctness in value co-occurrence with a small false alarm rate when tested on Custom Video Footage Dataset (CVFD) and Custom Personal Images Dataset (CPID) for finding out whether or not social distancing limitations were practiced or not [10].

A. Ksentini, B. Brik [13] has brought forward a merge of IoT and multi-access edge computing (MEC) technologies that verify and warn people in near real-time if they are not maintaining social distancing. Here at the client-side, the application is installed on the users' smartphone, which periodically sends GPS coordinates to remote servers including the edge of the network (i.e., at MEC). The remote servers use a local algorithm for detection and give warnings to users who are not maintaining social distancing.

III. PROBLEM STATEMENT

The purpose of this technical study is to raise awareness among people about the safety measures that should be taken due to the COVID-19 pandemic. Instead of using economically higher or using higher methods and techniques which would hard to understand the normal users, hence the proposed study in this paper has made the working process very smooth where CNN and YOLOv3 algorithms play an important role in it.

IV. PROPOSED SYSTEM

This paper utilizes algorithms like- the CNN algorithm which is mainly used for Face-Mask detection, and the YOLOv3 algorithm is mainly used for calculating the social distance between every individual. The working of the module is described in the paper which has been divided into a few sub-modules such as the Admin Module, Pre-processing Module, Segmentation Module, Feature Extraction Module, CNN Module, Classify Dataset Module, and End User.

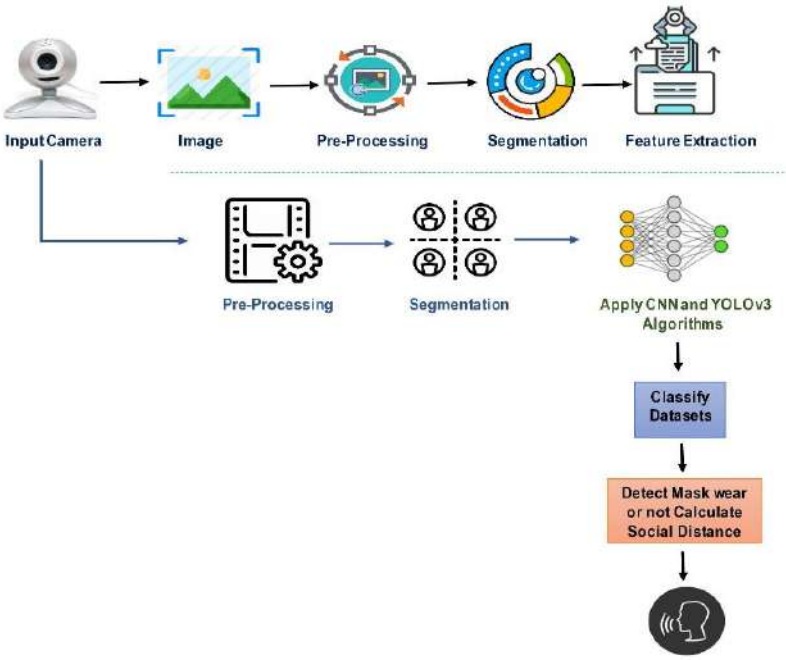

Figure -1: System Architecture

To get more accurate results here splitting technique is used which is the Training and Testing part [8]. From the reference of *Figure -1*, as the camera gets on it will start taking records of video then this video will be going to split into an image. These split images are Pre-Processed for cleaning and organizing image later Segmentation is done on this image in which the image is divided as per object wise then next comes Feature Extraction which performs to remove all unusable objects and take only important objects from the processed image. On this processed image CNN and YOLOv3 algorithms operations are performed to detect whether a person is wearing a mask or not and also calculate social distance. If the person is not wearing a mask and/or if a person is not following social distance the alert voice command is passed from the system.

4.1 Splitting Data:

Here the Splitting data technique is used by having Training and Testing sets which are two different but these both are important in Deep Learning and Machine Learning algorithms. The Training and Testing set has a Pareto ratio of 80:20 or sometimes it may be 70:30 [3] [8]. The Training part has a set of samples (such as a collection of photos or videos). The Training set makes accuracy in the predictions, and to train a model by using a training model means to create or fit a model. The Testing part is a subset to test the trained model or evaluate the fit. The testing set helps to validate the progress of algorithms training and adjust or optimize for improved results.

4.2 Convolutional Neural Network (CNN):

A Convolutional neural network (CNN) also known as ConvNets has one or more sequences of layers that are used mainly for image processing, image classification, segmentation, and image recognition. The CNN is a Feed-Forward artificial network in which the associative pattern between its neurons is motivated by the organization of the **visual cortex [22].** The CNN contains four layers: a convolutional layer, ReLU layer, Pooling layer, and Fully Connected layer [23]. The first layer is Convolutional takes an input image and performs a mathematical operation such as image matrix and kernel or any filter. The second layer is ReLU which separates all negative values from the filtered image and reinitiates them with zero [17]. The third layer is Pooling which is used for pre-processing on any image and Downscaling (decreasing) the number of parameters when images are too large. The pooling is of two types Max and Average Pooling [24]. In Max Pooling, the maximum value from the piece of the image is enclosed by the kernel is returned [17] [24]. On the other side, the Average Pooling comes back with the average of all the values from the piece of the image is enclosed by the kernel. The last or fourth layer is the Fully Connected or Dense layer where input from other layers is lessened into a vector or in short Flattening which transforms the entire pooled feature map matrix into a single column [14].

4.3 YOLOv3 (You Look Only Once Version 3):

More simply, You Look Only Once (YOLO) suggests that just "looking at the object only once" means in the input image it requires only one forward propagation which proceeds through the network for making predictions. It is remarked that YOLO is significant for the detection of real-time objects [14] [18]. It appeals to a one-single forward pass to absolute the image and anticipates bounding boxes and their class possibilities [14]. The characteristics of YOLOv3 are multi-scale detection and a powerful feature extraction network [14] [18]. YOLOv3 has superb speed (as compared to other object detection algorithms) - it's beyond a belief as fast and can process 45 frames per second. YOLOv3 has arisen with superior architecture with feature extractor used was hybrid YOLOv2, Darknet-53 (network trained on ImageNet), and last but not the least is Residual networks (ResNet). The network has 53 convolutional layers (which is named Darknet-53) and is additionally assembled with 53 more layers for detection head, and hence the formation of YOLOv3 is a total of 106 layers fully convolutional underlying architecture [18] [25]. The detection for ultimate results of the output of a fully convolutional network is performed by applying 1x1 detection kernels on a feature map of three non-identical sizes at three non-identical places this process is known to be a Multi-Scale detector. The Multi-Scale detector is used for verifying that small objects are also actually detected.

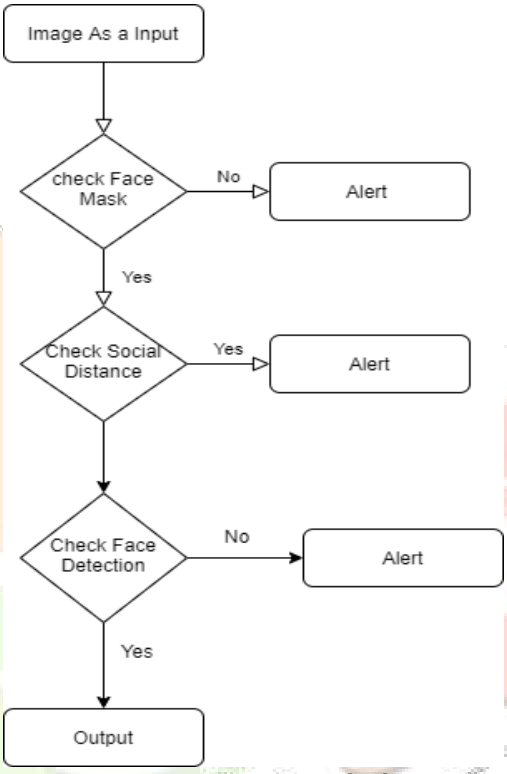

Figure -2: Work Flow

From Figure-2 it is easy to understand the workflow of the title of this paper. The work described in the paper is quite simpler as compared to related work [5] [8] [10] [12] [13]. This paper idea can be affordable by any organization, school, college, etc. The proposed research effort completes the main motive of wearing a Face-Mask and maintaining a Social-Distance.

V. CONCLUSION

The work proposed in this paper deals with measures to control COVID-19 disease. The measures for control are following social distancing, wearing a face mask and other basic sanitary measures are very important to avoid the spread of the Covid-19. Due to the consequences of controlling the COVID-19 pandemic, the application significance of the identification for the real-time face mask and social distancing detection is improving [21]. The proposed work in this paper incorporates the CNN algorithm for Face mask detection and the YOLO v3 algorithm is used for object and social distance detection. Hence, the proposed study in this paper deals with taking care of safety precautions for the COVID-19 pandemic with the proposed machine learning algorithm which is helpful for society.

REFERENCES

[1] V. Chamola, V. Hassija, V. Gupta, M. Guizani . 2020. A Comprehensive Review of the COVID19 Pandemic and the Role of IoT, Drones, AI, Blockchain, and 5G in Managing its Impact. IEEE. Vol 8. pp. 1–41.

[2] https://www.who.int/healthsystems/topics/health-law/chapter10.pdf

[3] P. Jana, M. Tiwari. 2021. Lean terms in apparel manufacturing. Woodhead Publishing. pp. 17-45.

[4] https://viso.ai/deep-learning/yolov3-overview/

[5] R. Sachdeva, Sonam, H. Sharma. 2020. Face Mask Detection System. IJSER. Vol. 11(Iss. 12). pp. 2-4.

[6] R. Md. Abdur, H. M. Shamim, N. A. Alrajeh, G. Nadra. 2020. B5G and Explainable Deep Learning Assisted Healthcare Vertical at the Edge-COVID-19 Perspective. IEEE. Vol. 34 (Iss. 4). pp. 1–8.

[7] G. Muhammad, M. F. Alhamid, and X. Long. 2019. Computing and Processing on the Edge: Smart Pathology Detection for Connected Healthcare. IEEE Network. Vol. 33 (Iss. 6), pp. 44–49.

[8] M. A. Malbog. 2019. MASK R-CNN for Pedestrian Crosswalk Detection and Instance Segmentation. IEEE 6th International Conference on Engineering Technologies and Applied Sciences (ICETAS). pp. 1-5

[9] S. M. Lundberg, G. Erion, H. Chen, A. DeGrave, Jordan M. Prutkin, B. Nair, R. Katz, J. Himmelfarb, N.Bansal, S. Lee. 2019. Explainable AI for Trees: From Local Explanations to Global Understanding. arXiv. pp. 56–67.

[10] S. Gupta, R. Kapil, G. Kanahasabai, S. S. Joshi, A. S. Joshi. 2020. SD-Measure: A Social Distancing Detector. IEEE. pp. 306-311.

[11] A. Srinivasan, L. Vig, and M. Bain. 2019. Logical Explanations for Deep Relational Machines Using Relevance Information. J. Machine Learning Research. arXiv. vol. 20. pp. 1–47.

[12] Y. C. Hou, M. Z. Baharuddin, S. Yussof, and S. Dzulkifly. 2020. Social Distancing Detection with Deep Learning Model. IEEE 8th International Conference on Information Technology and Multimedia. pp. 334-338.

[13] A. Ksentini, B. Brik. 2020. An Edge-Based Social Distancing Detection Service to Mitigate COVID-19 Propagation, IEEE Magazine. Vol. 3 (Iss. 3). pp. 35-39.

[14] S. Srivastava, A.V. Divekar, C. Anilkumar, I. Naik, V. Kulkarni, V. Pattabiraman. 2021. Comparative analysis of deep learning image detection algorithms. J Big Data 8-66. pp. 1-22

[15] https://www.javatpoint.com/convolutional-neural-network-in-tensorflow

[16] M. S. Hossain and G. Muhammad. 2019. Emotion Recognition Using Secure Edge and Cloud Computing. Information Sciences, vol.504. pp. 589–601.

[17] R. S. T. de Menezes, R. M. Magalhaes, H. Maia. 2019. Object Recognition Using Convolutional Neural Networks. Intechopen.89726. pp. 2-22

[18] J. Redmon, S. Divvala, R. Girshick, A. Farhadi. 2015. You Only Look Once: Unified, Real-Time Object Detection. arXiv. pp. 1-10.

[19] E. Oldfield, S. R. Malwal. 2020. COVID-19 and Other Pandemics: How Might They Be Prevented?. ACS Infectious Diseases.

[20] Y. Alharbi, A. Alqahtani, O. Albalawi, M. Bakouri. 2020. Epidemiological Modeling of COVID-19 in Saudi Arabia: Spread Projection, Awareness, and Impact of Treatment. Applied Sciences. Vol.10(Iss. 17). pp. 1-13.

[21] S. Teboulbi, S. Messaoud, M. A. Hajjaji, A. Mtibaa. 2021. Real-Time Implementation of AI-Based Face Mask Detection and Social Distancing Measuring System for COVID-19 Prevention. Scientific Programming. Vol.2021. pp 1-18.

[22] R A. Priyanka, C. Ashwitha, R A. Chakravarthi, R Prakash. 2018. Face Recognition Model Using Back Propagation. International Journal of Engineering and Technology (UAE). Vol. 7. pp. 237-240.

[23] H. Zhu, W. Ge, Z. Liu. 2019. Deep Learning-Based Classification of Weld Surface Defects. Applied Sciences. Vol. 9(Iss. 16). pp. 1-10.

[24] N. Jariya, V. K. Kutty Malu. 2020. Convolutional and residual networks for iris recognition. AIP Conference Proceedings. Vol. 2222(Iss. 1).

[25] J. Redmon, A. Farhadi. 2018. YOLOv3: An Incremental Improvement. aiXiv. pp. 1-6

[26] Z. Jie, Y. Li , R. Liu. 2019. Social Network Group Identification based on Local Attribute Community Detection. IEEE 3rd Information Technology, Networking, Electronic and Automation Control Conference (ITNEC). pp. 443-447.

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BOOK RECOMMENDATION SYSTEM USING MACHINE LEARNING

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Abstract: Users will use book recommendation systems to look and choose books from variety of choices out there on the net or in different electronic data sources. they provide the user with a tiny low selection of products that square measure well appropriate to the outline, given a large cluster of things and an outline of the user's wants. Our system can merely offer recommendations. Recommendations can be generated supported the user's previous activity, like shopping for habits, reviews, and likes. In this system, we have a tendency to square measure a major issue: once a user buys a book, we would like to advocate different books that the user would enjoy. shoppers even have too several selections once it involves recommending the simplest and most relevant books for them. up user privacy whereas imposing the smaller and smaller loss of accuracy on recommendations. The projected recommender system can offer its user's the power to look at and search books and mistreatment Support Vector Machine (SVM), it'll list the extremely purchased and prime rated books supported the topic name given because the input.

Index Terms - **Recommendation System; Support Vector Machine; Machine Learning.**

I. INTRODUCTION

In easy words, a recommendation system is any system that mechanically suggests content for web site readers and users. These systems evolve an intelligent algorithm, which generates recommendations to users. Machine learning has been improvising the recommendation systems, additionally it brings a lot of prospects to boost performance of recommendation system. Recommendation systems square have wide custom-made that uses collaborative filtering and content-based filtering severally. Library book recommendation system is the web application which is used to manage the library's repository. It is helpful in preserving databases for the book purchases which are available in the library. This system tracks several categories like books, journals, magazines, etc[3].

- **OBJECTIVE**

The library book recommendations uses the library management system where the admin adds the books and several categories of the book. Here the admin can handle the user sent books borrowing request and also returns the request. Admin can view the users, feedbacks, and the chat history of the user. In this, User can post feedbacks, send request to borrow and return books.

II. RELATED WORK

Sr. No.	Title of Paper and Year	Methodology	Findings
1.	Library Intelligent Book Recommendation System Using Facial Expression Recognitions-2020IEEE[1]	Convolution Neural Network Model.	[1]Obtain face image data through real-time cameras for analysis to determine user preferences. The books are recommended on user preference in recommendation system.
2.	Book Recommendation Website with Chatbot - 2020IEEE[2]	Chatbot, named wannaRead, was developed by using Engati to created this chatbot[2].	[2]1) Testing search functions including a book list, a character list and a book category. 2) Keeping users' search log that they asked the chatbot about books but they did not know the book title they wanted. 3) Top ten search words that users asked the most in the experiment.
3.	Cloud Based Collaborative Filtering Algorithm For Library Book Recommendation System - 2020IEEE[3]	Collaborative Filtering Methodology.	[3]Library Management System is a web application that manages a library's repository. This helps preserve databases of whole book purchases available in the library.
4.	DIGITAL LIBRARY USING HYBRID BOOK RECOMMENDATION ENGINE – 2019IEEE[4]	Hybrid Recommendation Engine.	[4]This web application will give recommendations to the user based on its past searches. It gives suggestions based on the user searches that are done by users and the rating given to books. Users has permission to download the book, admin accepts the request.
5.	Enhancing the Performance of Library Book Recommendation System by Employing the Probabilistic-Keyboard Model on a Collaborative Filtering Algorithm – 2019IEEE[5]	Collaborative Filtering method.	[5] This system is reliable and is mainly developed for colleges and schools where the users can borrow and return the books.

Table-1. Summary of related work

The proposed study in this paper is used for library book recommendation system which uses facial expression recognition technology which is used to recommend books to users. Facial expressions are one of the most important features to reflect the human emotional state because they convey useful information to the observer[6].

The goal of the purposed Technical study presented goal is to remind and recommend best selling novels to those people because the reading is important. The benefit of reading is as follows: cognitive mental stimulation also brain exercising, vocabulary and knowledge expansion, lower levels of stress and tension relief, helps with depression and the dysthymia, memory improvement and better focus, strengthens your writing abilities, and so on [7].

To carry out the library's everyday work in a productive manner. A library is a website where the admin develops a system to store and retrieve books can from the database. The cloud-based library book recommendation system uses collaborative filtering algorithm to add books on category based and give recommendation of top-rated(5-star rating) books to the users from the admin[3].

The digital Library Management System with use of Hybrid recommendation is designed software for the collection of the material and the digital content, storing, available for the users, simplifying users search with recommendation[4].

III. PROPOSED SYSTEM

In the proposed system, an online application is developed for the library book recommendation. During this system, all books within the library are given ratings. The library users WHO borrow the books post their ratings (5-star ratings) and also the top-rated books will be presented the users during this system. This is an automated system which is able to facilitate the library user to settle on the best version of the book of his/ her space of interest at intervals a few seconds reckoning on the ratings given thereto book. The user will select the book, borrow the book and even get the book delivered to his/ her address by simply sitting before of a computer. this technique uses a cooperative filtering algorithmic rule which filters the books supported the ratings and recommendations to the users. this system takes the user ratings and also the user feedback into thought to advocate books to the users. though this technique gathers the user's identification and authorization before shipping the book to the user address.

This system is accurate, reliable and dynamic. The advantages of this system are it is time and cost-efficient and also reduces manual work. Below figure 1 shows the architecture of the overall system, which will be implemented to achieve the objective of the library to satisfy our goals.

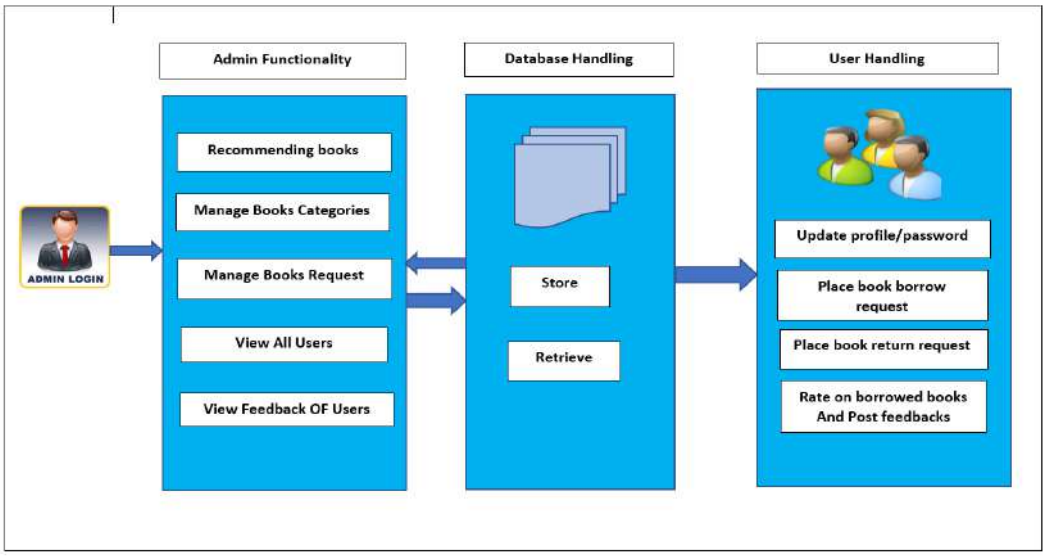

Figure -1: System Architecture

4.1 User Module:

User Plays a crucial role wherever the user needs to check if he/or she is the not the member of the library then after their registration the user will check in with the e-mail id and wod that's autogenerated within the user email id. After categories,read recommendation that's the top-rated books will be placed initial. The books borrowed by the user is been tracked down exploitation Collaborative filtering algorithm program technique.The user World Health Organization borrowed the books will solely give the ratings on the books and therefore the user feedback. At the time of confusion that book bought to be hand-picked the user will even get suggestions or have a live chat with alternative on-line users.

The below figure three shows the opertions or the flow of the user that may perform within the system from the signup to the sign-out method.

4.2 Collaborative filtering algorithm:

The Collaborative filtering algorithm is the technique which is used to filter the items that users may like on the basis of the users reactions by similarity users. In this algorithm, the users looks at the items they may like and combines the items to create a ranked list of suggestions[8]. In Collaborative Filtering algorithm, it finds similar users and recommends what the similarity users like. In recommendation system, it don't use the features of the items to recommend, rather we classify the users into the clusters of similar types, and recommend each user according to the preference of its cluster[9].

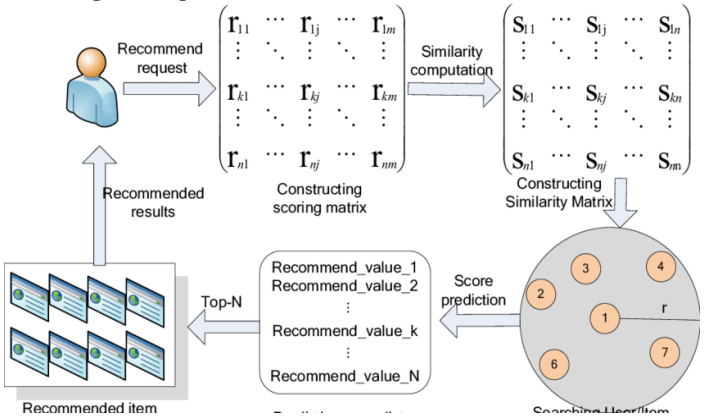

Fig.2. Collaborative Filtering Algorithm[10]

IV. CONCLUSION

The overall process of recommending books to the user of all age group category make use of collaborative filtering methodology where different users give ratings on the same book and the average number of rating is been calculated and the top-rated book is been recommended to the user. The system mainly focuses on the easy finding of best books which does not need much time or work. The process of this system is accurate, reliable and cost-free. The income of this system is penalty fee collection when the book is not returned within the due time. The cloud-based library book recommendation system can be used from mobile and pc as its user friendly, authentic and also time and cost-efficient[3].

REFERENCES

[1]Yizhu Zhao ,Jun ZengSchool of Big Data and Software Engineering Chongqing University Chongqing, China," Library Intelligent Book Recommendation System Using Facial Expression Recognition".2020IEEE

[2]Jaturawit Chaiwong, Nattapon Prajugjit, Kingkarn Sookhanaphibarn BU-Multimedia Intelligent Technology Laboratory,School of Information Technology and Innovation Bangkok University, Thailand," Book Recommendation Website with Chatbot".2020IEEE

[3]Anoop A Department of Computer Science, N Ayush Ubale Department of Computer Science Amrita School Of Arts And Science, Mysore Amrita Vishwa Vidyapeetham Mysore, India," Cloud Based Collaborative Filtering Algorithm ForLibrary Book Recommendation System"2020IEEE.

[4]A.B. BAGWAN,PRIYARANJAN SINGH, 3MOUMI SARKAR, SONALI SATPUTE, 5 SOPHIA SHIRSATH," DIGITAL LIBRARY USING HYBRID BOOK RECOMMENDATION ENGINE".

[5]Noor Ifada,Irvan Syachrudin,Mochammad Kaustar Sophan,Sri Wahyuni,"Enchancing the Performance of Library Book Recommendation System by Employing the Probabilistic-Keyboard Model on a Collaborative Filtering Algorithm.

[6]K. M. Goh, C. H. Ng, L. L. Lim, and U. U. Sheikh, "Micro-expression recognition: an updated review of current trends, challenges and solutions," vol. 36, no. 3, pp. 445-468, 2018.

[7]C. M. Ross, "Summer reading lists: The importance of reading," BAOJ Neurol, vol. 3, p. 040, 2017.

[8] https://realpython.com/build-recommendation-engine-collaborative-filtering/

[9]https://www.geeksforgeeks.org/collaborative-filtering-ml/

[10] https://www.researchgate.net/figure/General-recommendation-process-of-collaborative-filtering-algorithm_fig1_332293983

[11] Manojit Nandi developed " Recommender Systems through Collaborative Filtering"(July(2017)

[12] Priyadharshini.Et.alelucidated "Analysis and performance of collaborative filtering and Classification Algorithms", International Journal of applied engineering research, vol.10, pp.24529-24520,2015.

[13] K. M. Goh, C. H. Ng, L. L. Lim, and U. U. Sheikh, "Micro-expression recognition: an updated review of current trends, challenges and solutions," vol. 36, no. 3, pp. 445-468, 2018.

[14] The best free Chatbot Platform, 2018 (accessed December 31, 2019).[Online]. Available: https://www.engati.com

[15] R. Bell, Y. Koren, C.Volinsky, "Modeling relationships at multiple scales to improve accuracy of large recommender systems" KDD '07: Proceedings of the 13th ACM SIGKDD international conference on Knowledge discovery and data mining, New York, NY, USA, 2007, ACM pp. 95-104

[16] Yang yan and Li Jianzhong, 2005. Interest-based recommendation in digital library. J. Comp.Sci., 1: pp 40- 46 Tingting Zhu, Lili Zhang," Application of Data Mining in the Analysis of Needsof University Library Users", The 6th International Conference on Computer Science & Education (ICCSE 2011),pp.391-394, August 3-5, 2011.

[17] Poonam Ghuli, Atanu Ghosh, Dr. Rajashree Shettar," A Collaborative Filtering Recommendation Engine in a Distributed Environment", 2014 International Conference on Contemporary Computing and Informatics (IC3I), pp. 568-574, 2014.

[18] Chen C, Zhang L, Qiao H, Wang S, Liu Y, Qiu X. Book recommendation based on book-loan logs. In The 2012 International Conference on Asian Digital Libraries; 2012; Taiwan, China. p. 269-78.

[19] Jomsri P. Book recommendation system for digital library based on user profiles by using association rule. In The 4th edition of the International Conference on the Innovative Computing Technology (INTECH 2014); 2014; Luton, UK. p. 130-134.

[20] Konstan JA, Riedl J. Recommender systems: From algorithms to user experience. User Modeling and User-Adapted Interaction. 2012; 22(1-2): p. 101-123.

[21] Sarwar B, Karypis G, Konstan J, Riedl J. Item-based collaborative filtering recommendation algorithms. In The 10th International Conference on World Wide Web; 2001; Hongkong. p. 285-295.

[22] Lops P, Gemmis M, Semeraro G. Content-based recommender systems: State of the art and trends. In Recommender systems handbook.:Springer; 2011. p. 73-105.

[23] Ekstrand MD, Riedl JT, Konstan JA. Collaborative filtering recommender systems. Human–Computer Interaction. 2010; 4(2): p. 81-173.

[24] Amrita.R. Et.al added "An analysis on the performance Evaluation of collaborative filtering algorithms using apache mahout", International Journal of applied engineering research, (IJAER), vol.10, pp.14797-14812,2015

[25] V. Kavinkumar Reddy.Et.al interpreted "A hybrid approach for recommendation system with added feedback component", International Conference on advances in computing, communication and informatics,pp.745-752,2015.

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Sign Language Recognition Based on Machine Learning

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Abstract: *Speaking with individuals having a meeting inability is a significant test. To beat this issue, information on Sign language turns into a wellspring of correspondence for an individual with a consultation incapacity. Communication via gestures is a stage forward for aiding the debilitated by eliminating the correspondence hole between the networks thus, laying out an easy method for interfacing those networks. To make an extension for passing on the message community body parts, for example, hands and looks are utilized. In this paper, we acquaint you with Sign Language acknowledgment utilizing American Sign Language. The primary target of our electronic application is to make all networks acquainted with American Sign Language (ASL) regularly utilized. By alluding to numerous different creators, we have contributed a more dependable, easy to understand and advantageous electronic application for more prominent correspondence to make a superior future in Sign Language Communication.*

I. INTRODUCTION

Communication is the trading of thought, information, feeling utilizing a few general medium sources. As typical individuals, we utilize spoken method of correspondence however there are a few group dealing with issue with correspondence due to the incapacity of hearing and talking, speaking with such individuals has forever been a test. Communication through signing is one of the media to speak with individuals with incapacity of hard of hearing and quiet, it is only a visual portrayal of considerations or data used to pass on the message utilizing hand signals and looks. There are in excess of 300 unique kinds of gesture based communications everywhere, which differ from one country to another. Indeed, even in nations where a similar language is communicated in, communication through signing can have a wide range of territorial accents that carry varieties to individuals' utilization and comprehension of signs. In this venture, we like to acquaint you with the mostly used sign language that is:

AMERICAN SIGN LANGUAGE

American Sign Language (ASL) is a finished, regular language that has similar semantic properties as communicated in dialects, with punctuation that varies from English. No individual or board of trustees created ASL. The specific starting points of ASL are not satisfactory, yet some propose that it emerged over quite a while back from the intermixing of nearby communications through signing and French Sign Language (LSF, or Langue des Signs Francoise). The present ASL incorporates a few components of LSF in addition to the first neighborhood gesture based communications; over the long run, these have merged and changed into a rich, complex, and mature language.

II. PROBLEM STATEMENT

Communication is a two-way source among shipper and beneficiary so the mechanism of correspondence should same and the information on a medium ought to be notable. So the handicapped as well as an ordinary individual ought to have proper information on communication through signing. To get familiar with a communication through signing individual ought to contribute time to acquire legitimate information on it. As the issue of hindering is the correspondence hole between both the networks in which one of them can't talk due to incapacity and the other can yet not know about gesture based communication. With the assistance of our electronic application which displays the appropriate explanation to the client about Sign Languages, with the assistance of an inserted camera that catches the hand motion and shows the relevant importance for the sign that performed. Hence, the application can likewise be utilized to offer critical information about Hint Language and clients can advance unquestionably.

III. LITERATURE SURVEY

[1]Greeshma Pala et al. developed the model "Machine Learning – based Hand Sign Recognition". In this study there is comparison done for referred dataset using different algorithms. Recent systems have come up with various ways and algorithms to accomplish the problem and build this system. Algorithms such as K-Nearest neighbors (KNN), Multi-class Super Vector Machine (SVM), and experiments using hand gloves were used to decode the hand gesture movements before. In this paper, a comparison between KNN, SVM, and CNN algorithms is done to determine which algorithm would provide the best accuracy among all.

Approximately 29,000 images were split into test and train data and preprocessed to fit into the KNN, SVM, and CNN models to obtain an accuracy of 93.83%, 88.89%, and 98.49% respectively.

[2]Rachana Patil et al. developed the model "Indian Sign Language Recognition using Convolution Neural Network". The work presented in this paper is an exertion (extension) towards examining the difficulties in classification of characters in Indian Sign Language (ISL). In this paper, there is introduction of Sign Language Recognition using Indian Sign Language. The user must be able to capture images of hand gestures using a web camera in this analysis, and the system must predict and show the name of the captured image. The captured image undergoes series of processing steps which include various computer vision techniques such as the conversion to gray-scale, dilation and mask operation. Convolutional Neural Network (CNN) is used to train the model and identify the pictures. The model has achieved accuracy of about 95%.

[3]Hoshang Kolivand et al. developed the model "A new framework for sign language alphabet hand posture recognition using geometrical features through artificial neural network". This framework which is called ASLNN proposes a new hand posture recognition technique for the American Sign Language alphabet based on the neural network which works on the geometrical feature extraction of hands. A user's hand is captured by a three-dimensional depth-based sensor camera; consequently, the hand is segmented according to the depth analysis feature. The proposed system is called depth-based geometrical sign language recognition (DGSLR). The proposed geometrical feature extraction framework improves the accuracy of recognition due to unchangeable features against hand orientation compared to discrete cosine transform and moment invariant. The findings of the iterations demonstrate the combination of the extracted features resulted to improve accuracy rates. Then, an artificial neural network is used to drive desired outcomes. ASLNN is proficient to hand posture recognition and provides accuracy up to 96.78%.

[4]Hoshang Kolivand et al. developed the model "An implementation of sign language alphabet hand posture recognition using geometrical features through artificial neural network". This framework proposes hand posture recognition of the American Sign Language alphabet based on a neural network (NN) which works on geometrical feature extraction of the hand. The novelty in this work is using a new method of geometrical feature extraction which leads to get more accurate classification in the classifier. I fact, a new integration of the extracted features, geometrical features of the hand is presented in sign language recognition system. Furthermore, the proposed system uses a new simple approach for segmentation in different backgrounds. The proposed methods cater for the weakness in the hand posture recognition system to develop an SLR system. These methods are applied in segmentation and feature extraction phases and can increase the overall accuracy due to the depth-based images and geometrical features of the hand. The proposed framework is proficient to hand posture recognition and provides an accuracy of up to 96.78%.

[5]Munner Al-Hammadi et al. developed the model "Deep Learning-Based Approach for Sign Language Gesture Recognition with Efficient Hand Gesture Representation". The importance of hand gesture recognition has increased due to the prevalence of touchless applications and the rapid growth of the hearing-impaired population. However, developing an efficient recognition system needs to overcome the challenges of hand segmentation, local hand shape representation, global body configuration representation, and gesture sequence modeling. In this paper, a novel system is proposed for dynamic hand gesture recognition using multiple deep learning architectures for hand segmentation, local and global feature representations, and sequence feature globalization and recognition. The proposed system is evaluated on a very challenging dataset, which consists of 40 dynamic hand gestures performed by 40 subjects in an uncontrolled environment. The results show that the proposed system outperforms state-of-the-art approaches, demonstrating its effectiveness.

[6]Amrutha K and Prabu P developed the model "ML Based Sign Language Recognition System". This paper reviews different steps in an automated sign language recognition (SLR) system. Developing a system that can read and interpret a sign must be trained using a large dataset and the best algorithm. As a basic SLR system, an isolated recognition model is developed. The model is based on vision-based isolated hand gesture detection and recognition. Assessment of ML-based SLR model was conducted with the help of 4 candidates under a controlled environment. The model made use of a convex hull for feature extraction and KNN for classification. The model yielded 65% accuracy.

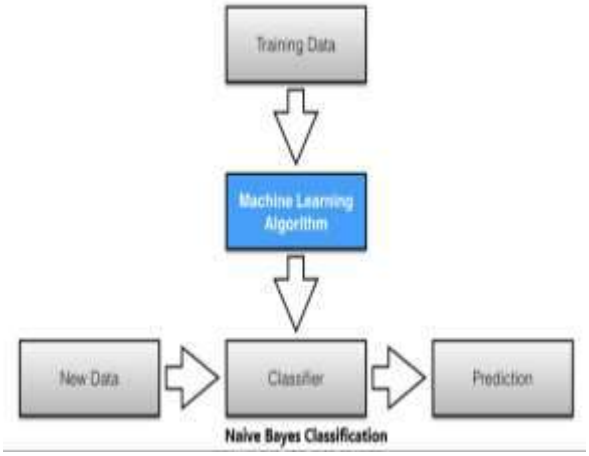
IV.SYSTEM DESIGN

Our project is mainly based on three major Algorithms:-

1. Naïve Bayes Algorithm
2. Support Vector Machine Algorithm
3. KNN Algorithm
4. CNN Algorithm

NAÏVE BAYES ALGORITHM –

The naïve Bayes Algorithm is one of the supervised learning algorithms, mainly used in text classification that includes a high-Dimensional training dataset. It is one of the user-friendly, times consuming and most an effective algorithm that helps in building the fast machine learning models that can make quick predictions.



Naive Bayes Classification

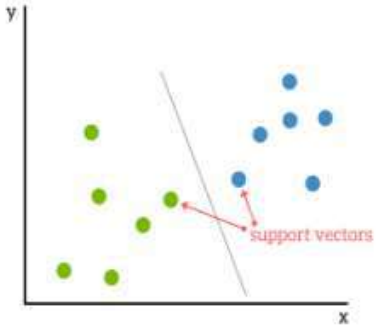
Working of Naive Bayes Algorithm:

Working of Naive Bayes Algorithm is specified into 3 operations:

1. Convert the given image dataset into frequency table.
2. Generates the possibility table by finding the probabilities of given features.
3. And use the Bayes law/rule to calculate the posterior probability.

SUPPORT VECTOR MACHINE (SVM) –

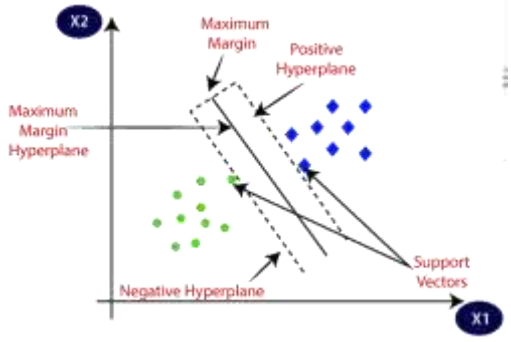
Support Vector Machine is also a supervised Learning algorithm mainly used for a Classification as well as a Regression problem. The goal of the (SVM) support vector Machine algorithm is to find a hyper plane in An N-dimensional space (N — the number of Features) that distinctly classify the data points.



SVM Classification

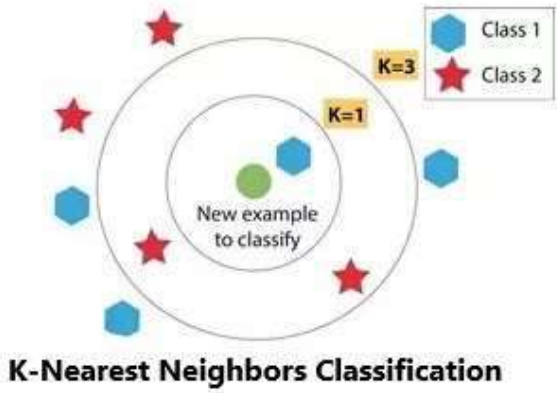
Working of Support Vector Machine:

As shown in below figure, suppose we have a dataset that has two tags (green and blue), and the dataset has two features x1 and x2. We want a classifier that can classify the pair(x1, x2) of coordinates in either green or blue. So as it is 2-d space so by just using a straight line, we can easily separate these two classes. But there can be multiple lines that can separate these classes.



KNN ALGORITHM –

KNN Algorithm stands for K-Nearest Neighbour is one the simple machine learning an algorithm based on supervised learning Technique. KNN algorithm presumes the analogy between the data and already available data and put the new data into the Grouping that is most alike to the available Categories. The number of nearest neighbors to a new unknown variable that has to be predicted



K-Nearest Neighbors Classification

or classified is denoted by the symbol 'K'.

Working of K-Nearest Neighbors:

Algorithm:

Step-1: Select the number K of the neighbors

Step-2: Calculate the Euclidean distance of **K number of neighbors**

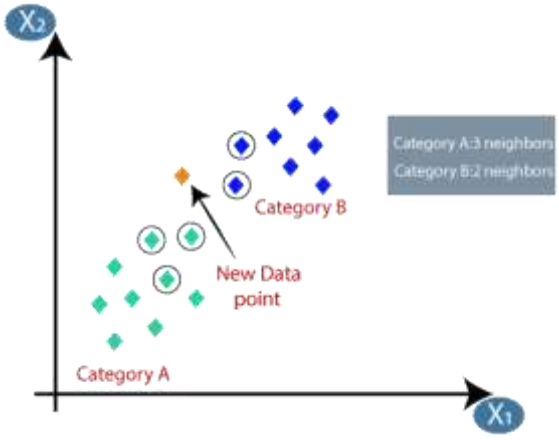
Step-3: Take the K nearest neighbors as per the calculated Euclidean distance.

Step-4: Among these k neighbors, count the number of the data points in each category.

Step-5: Assign the new data points to that category for which the number of the neighbor is maximum.

Step-6: Our model is ready.

Firstly, we will choose the number of neighbors, so we will choose the k=5. Next, we will calculate the Euclidean distance between the data points. The Euclidean distance is the distance between two points, which we have already studied in geometry. By calculating the Euclidean distance we got the nearest neighbors, as three nearest neighbors in category A and two nearest neighbors in category B. Consider the below image:



As we can see the 3 nearest neighbors are from category A, hence this new data point must belong to category A.

CNN ALGORITHM –

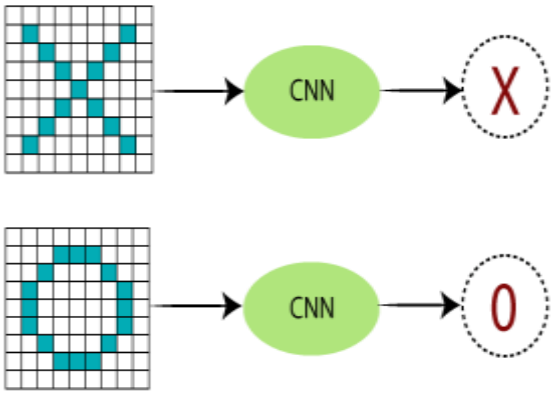
CNN stands for Convolution Neural Network, is a deep learning is a Deep Learning algorithm which can take in an input image, assign importance to various objects in the image and be able to differentiate one from the other. The pre-processing required in a Convolution is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, Convolution has the ability to learn these filters/characteristics.

Working of CNN Algorithm:

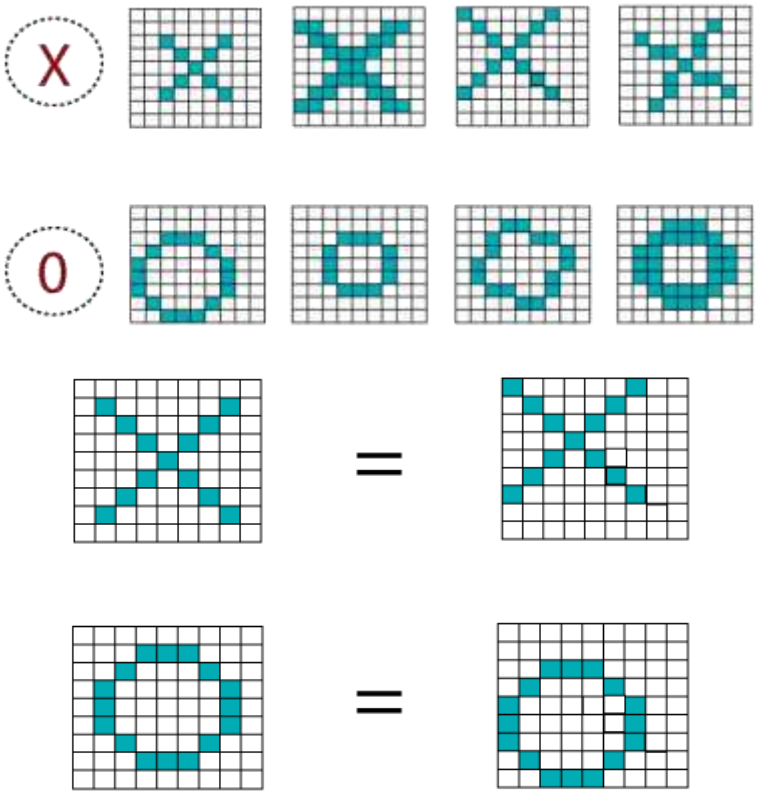
A Convolutional neural network has three layers. And we understand each layer one by one with the help of an example of the classifier. With it can classify an image of an X and O. So, with the case, we will understand all four layers.

Convolutional Neural Networks have the following layers:

- Convolutional
- ReLU Layer
- Pooling
- Fully Connected Layer



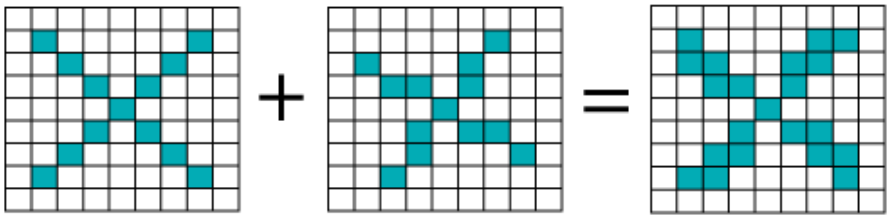
There are certain trickier cases where X can represent in these four forms as well as the right side, so these are nothing but the effects of the deformed images. Here, there are multiple presentations of X and O's. This makes it tricky for the computer to recognize. But the goal is that if the input signal looks like previous images it has seen before, the "image" reference signal will be convolved with, the input signal. The resulting output signal is then passed on to the next layer. Consider the diagram shown below:



A computer understands an image using numbers at each pixel.
In our example, we have considered that a **blue** pixel will have value **1**, and a **white** pixel will have **-1** value. This is as the way we've implemented to differentiate the pixels in a primary binary classification.

-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	1	-1	-1	-1	-1	-1	1	-1
-1	-1	1	-1	-1	-1	1	-1	-1
-1	-1	-1	1	-1	1	-1	-1	-1
-1	-1	-1	-1	1	-1	-1	-1	-1
-1	-1	-1	1	-1	1	-1	-1	-1
-1	-1	1	-1	-1	-1	1	-1	-1
-1	1	-1	-1	-1	-1	-1	1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1

When we use standard techniques to compare these two images, one is a proper image of X, and another is a distorted image of X. We found that the computer is not able to classify the deformed image of X. It is comparing with the proper representation of X. So when we add the pixel values of both of these images, we get something, so a computer is not able to recognize whether it is an X or not.



With the help of CNN, we take small patches of our image, so these pieces or patches are known as filters. We were finding rough feature matches in the same position in two pictures. CNN gets better with the similarity between the whole image matching schemes. We have these filters, so consider this first filter this is precisely equal to the feature of the part of the image in the deformed images as well as this is a proper image.

The following components provide the representation of the dataset that was cast-off for hand sign Recognition:

A. Input Data and Training Data

With assistance of a web camera, the pictures are gathered. Pictures should be prepared and tried appropriately as per the segment made. The hand sign motions were imagined with assistance of a web camera by 4 people. The hand signs were finished involving one hand and, surprisingly, two hands sometimes according to the sign prerequisite. Image Recognition turns out to be simple with various difference and furthermore more effective assuming the foundation is less mind boggling on the hand.

B. Dataset

We are implementing one sign languages that is American Sign Language (ASL). American Sign Language has 26 alphabets which also have 1000 images. So, the total numbers of images in dataset is 26,000.

C. Pre-processing

Nominal pre-processing was placed in over the dataset pictures to reduce the computational complexity and accomplish superior effectiveness and exactness. Resizing of pictures was then done to speed up the speed of handling and to avoid any memory blunders.

D. Segmentation

The method involved with isolating the pictures into minute sections wherefrom information can be recovered is segmentation. Since broad dataset is given from the hand parts, it ought to be isolated from individual video outline. Segmentation should be possible based on tone, shape, or edge, depending on the necessity and sort of the picture. The most usually utilized segmentation techniques are - color based division and edge-based division.

E. Feature Extraction

The pre-processed information with high dimensionality will require tremendous computational expenses whenever taken direct for order. This issue can be settled with the guide of feature extraction. Decrease of aspects without confronting any deficiency of in

data is done during the time spent highlight extraction. The elements existing in the picture can be suitable, improper or unnecessary.

F. Classification

The most common way of bringing information and ordering them for acknowledgment is classification. In classification, a program review from the given dataset and afterward orders it into particular classes or gatherings. For classification, algorithms such as, the k-Nearest Neighbors (KNN), Support Vector Machine (SVM) Naïve Bayes calculation, Logistic Regression, Decision Tree Classification, and Random Forest Classification can be utilized.

V. CONCLUSION

This study proposed an online use of gesture based communication acknowledgment utilizing American Sign Language (ASL). The proposed online application will assist with eliminating the correspondence hole by being an instructional exercise to learn and figure out the gesture based communication. In this, we have utilized a dataset of 57,000 pictures for both testing and preparing. Calculations, for example, Naïve Bayes calculation, Support Vector Machine (SVM), k-Nearest Neighbors (KNN) and Convolutional Neural Network (CNN) are utilized for preparing the dataset and acquiring results.

VI.FUTURE SCOPE

This system is the outlook for proper communication between the disabled entities and other entities using sign language recognition based on machine learning. t very well may be additionally expanded for exhibiting sentences than rather letters. Other than ASL more unique gesture based communications like Indian Sign Language, Chinese Sign Language, French Sign Language, Spanish Sign Language, and so forth can likewise be presented. The dataset for preparing can likewise be expanded for better precision and results. The extent of this task can likewise be stretched out by presenting another module wherein the signs can be changed over completely to discourse.

References

1. *Ms. Greeshma Pala, Ms. Jagruti Bhagwan Jethwani, Mr. Satish Shivaji Kumbhar, Ms. Shruti Dilip Patil "Machine Learning based Hand Sign Recognition" (ICAIS-2021).*
2. *Rachana Patil, Vivek Patil, Abhishek Bahuguna, Gaurav Datkhile "Indian Sign Language Recognition using Convolutional Neural Network" (ICACC-2021).*
3. *Hoshang Kolivand, Saba Joudaki, Mohd. Shahrizal Sunar, David Tully "A New Framework for Sign Language Alphabet Hand Posture Recognition using Geometrical Features through Artificial Neural Network" (Neural Computing and Applications 2020).*
4. *Hoshang Kolivand, Saba Joudaki, Mohd. Shahrizal Sunar, David Tully "An Implementation of Sign Language Alphabet Hand Posture Recognition Using Geometrical Features through Artificial Neural Network" (Neural Computing and Applications 2020).*
5. *Muneer Al-Hammadi, Ghulam Muhammad, Wadood Abdul, Mansour Alsulaiman, Mohd. A. Bencherif, Tareq S. Alrayes, Hassan Mathkour, Mohd. Amine Mekhtiche "Deep Learning Based Approach for Sign Language Gesture Recognition with Efficient Hand Gesture Representation" (IEEE Access 2020).*
6. *Amrutha K, Prabu P "ML Based Sign Language Recognition System" (ICITIIT 2021).*
7. *https://www.javatpoint.com/*